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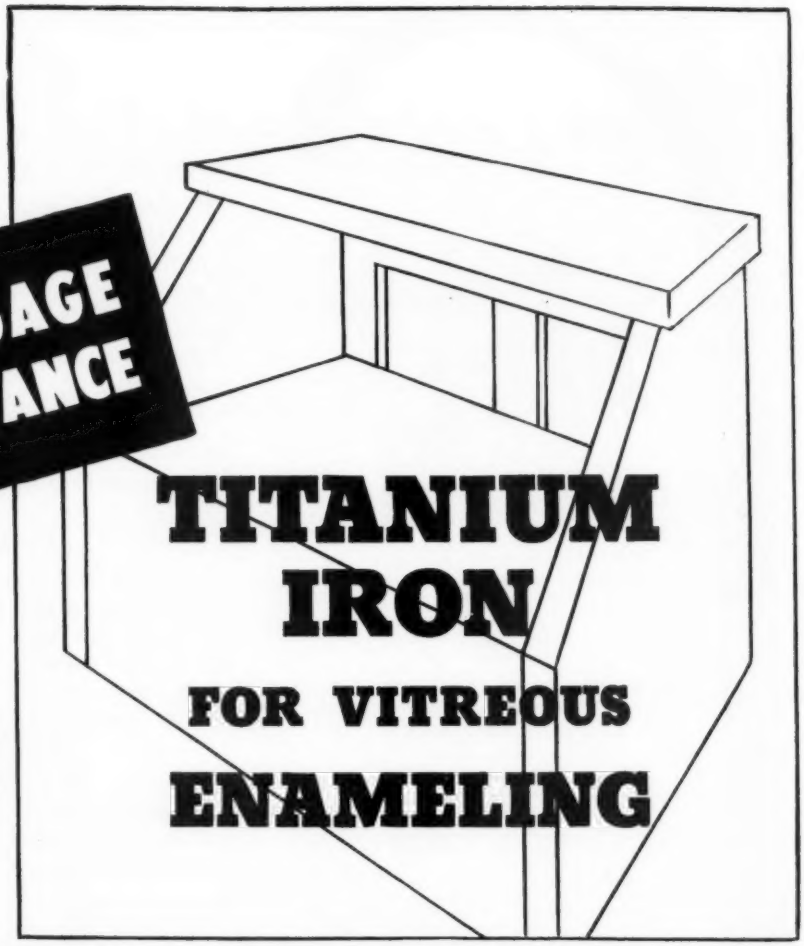
CERAMIC FINISHES ON METAL

THINNER GAGE SAG RESISTANCE



TITANIUM IRON FOR VITREOUS ENAMELING

ENAMELED WARE of lighter gage stock can be fabricated to desired shapes and retain a better appearance because of the increased sag resistance of Titanium iron for vitreous enameling. This particular feature is clearly demonstrated on chart at right.

Another feature is the elimination of formerly necessary ground coats. For—under proper shop conditions—the cover coat can be applied directly to the base metal. Also, these thin finishes reduce the hazards of chipping and breaking. Furthermore, at enameling heats, there is no sign of enamel boiling. During three years of both research and production experience, no case of fish scaling has been reported.

Further information is available upon request.

EFFECT OF GAGE AND COMPOSITION ON SAGGING RESISTANCE

GAGE AND COMPOSITION	DEGREE OF SAG IN %
24 Ga. Standard Enameling Iron	100
24 Ga. Titanium Steel	57
18 Ga. Standard Enameling Iron	100
18 Ga. Titanium Steel	18

The Titanium Alloy Manufacturing Company produces the titanium alloy used in the manufacture of this steel. For samples of this steel, see your steel supplier. Pending patent applications on the new enameling process and products made thereby are owned jointly by Inland Steel Company, and The Titanium Alloy Manufacturing Company under trust agreement.

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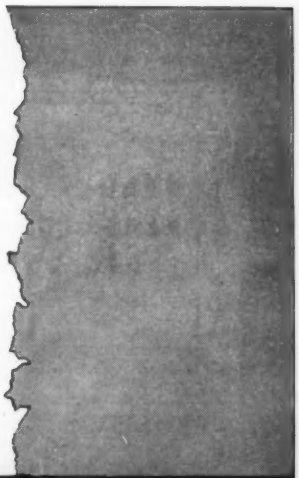
Grind on Iron?

NOT A CHANCE WITH

McDANEL

MILL HEAD ASSEMBLIES



In the sketch below notice how the specially shaped brick completely cover the door and frame castings. With McDanel Mill Head Assemblies it's impossible to grind on iron and contaminate the mill slip.

Notice too the position of the unloading tube. It's impossible for any unground particles to be discharged with the slip.

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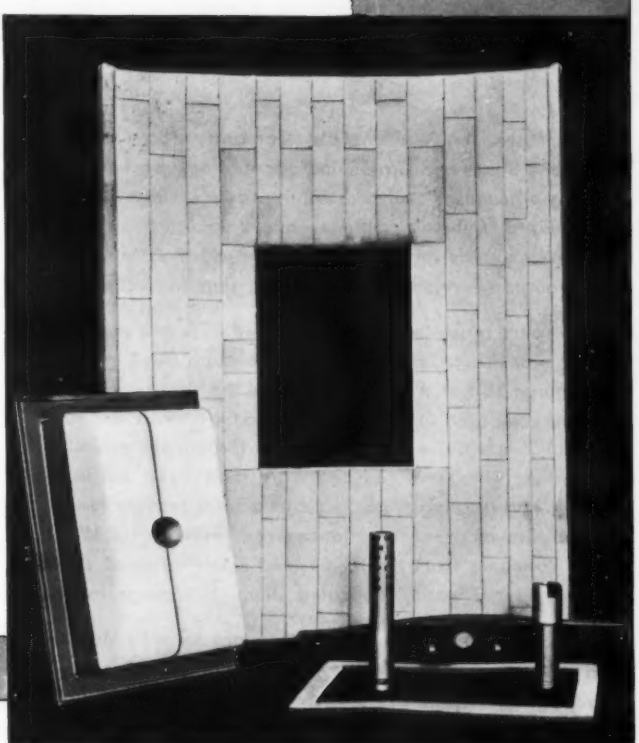
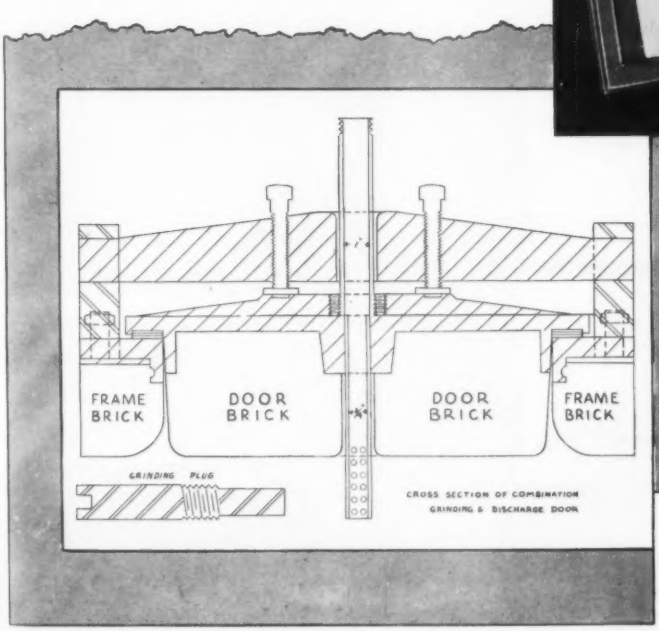


Mill Head Assemblies
Standard Mill Lining Bricks
Metal Covered Grinding Jars and Jar Mills.

Door Lining Blocks
Special Mill Lining Shapes
Porcelain Grinding Jars and Jar Mills.



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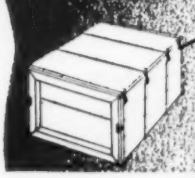

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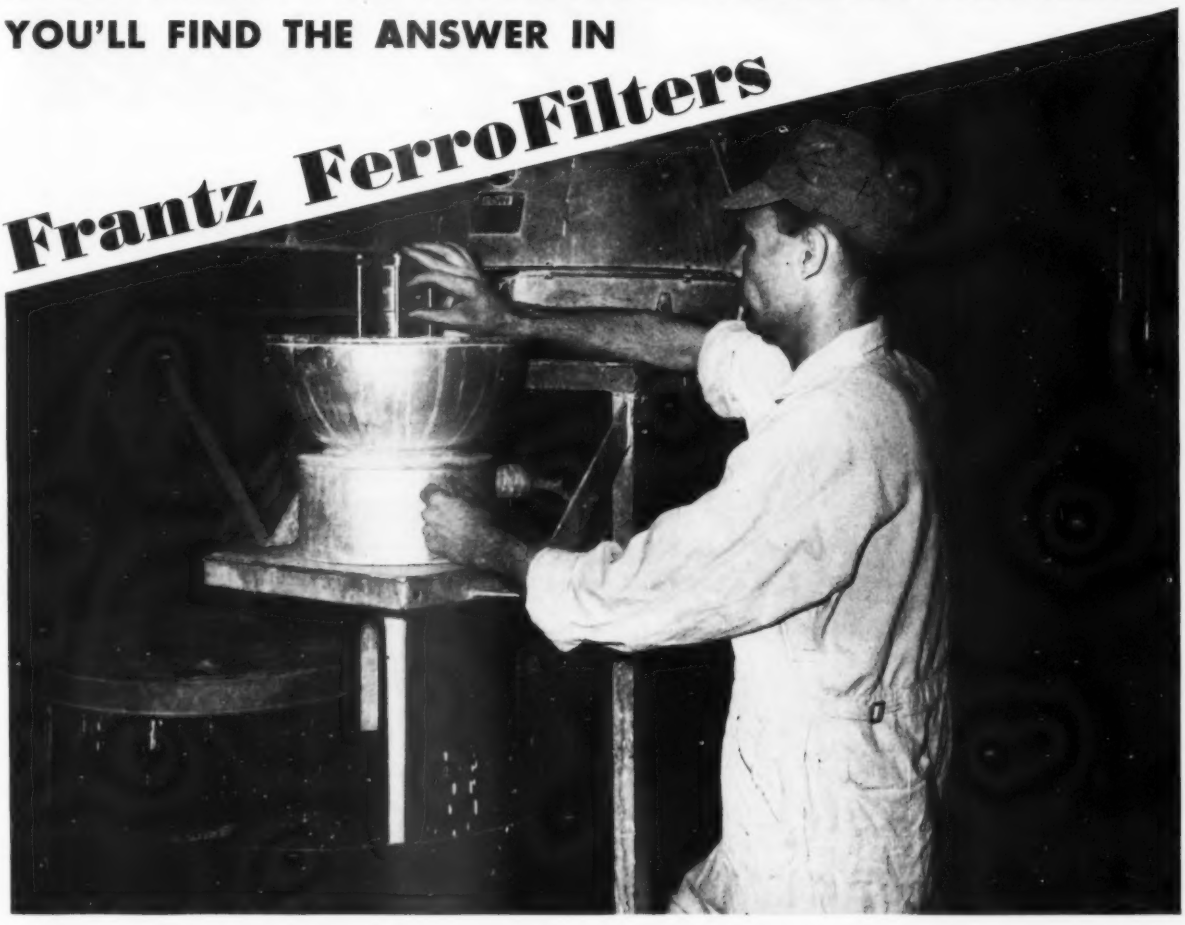

To produce perfect porcelain enameled steel plumbing ware, enamels must be clean. At the Briggs Beautyware plant (Briggs Manufacturing Company) Frantz FerroFilters keep the enamel slip clean.

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THE Finish Line

OUR LARGEST MARKET for porcelain enameled metal has always been and, from current indications, will continue to be, at least for some time to come, in the field of cooking and heating appliances.

Notwithstanding the steel shortage, the first quarter of 1947 showed shipments in large volume which not only dwarfed the business for the first quarter of 1946 but, in major classifications, showed a sizable increase in both production and shipments over the so-called "base period" (July 1, 1940, through June 30, 1941).

America cooks on porcelain enamel

The first quarter of 1947 showed shipments of cooking appliances totaling $80,945,256, compared with $38,507,142 for the first quarter of 1946. Lead items in these totals include over $26,000,000 for standard ranges for use with natural and manufactured gas; over $19,000,000 for electric ranges of standard types; almost $8,000,000 for standard ranges for LP-gas; and over $7,000,000 for coal and wood ranges.

Other items totaling from $1,000,000 to over $3,500,000 each include kerosene, gasoline and fuel oil cooking stoves; low oven kerosene ranges; combination ranges for natural and manufactured gas and oil; and apartment ranges for gas and electricity.

Here's the biggest single market for porcelain enamel—one of long standing, and one that should certainly continue to be the bulwark of the industry's business. Despite the attempt of organic finishes to encroach on this valuable field, there is no reason to expect any serious competition as long as porcelain enamel is the *only* finish that can successfully withstand the heat, abrasion and tough usage inherent in the cooking appliances, and as long as porcelain enamel continues its rapid improvement in its service to this field.

Heating appliances a big market too

Reports for the first quarter of this year show heating appliances—including those for gas; wood; coal and wood; kerosene, gasoline and fuel oil—being shipped at the rate of $24,709,264. This compares with $13,933,536 for the first quarter of 1946.

The top item in this group is the flue connected circulator with vaporizing burner—in the kerosene, gasoline and fuel oil class—totaling $11,513,609. Gas heaters come next in volume, ranging from over $1,500,000 for radiants to about $2,500,000 each for vented circulators and unvented circulators.

In this market, porcelain enamel has not faired so well. De luxe lines of circulators and certain parts of radiants and other types of heaters are, of course, porcelain enameled, but the vast volume represented in these shipping figures is still largely produced with organic finishes.

Here's the place for porcelain enamel to do a job. Few would contend that the organics can compare with porcelain enamel in heat resistance, longevity or beauty. It is up to the porcelain enameling industry to prove to the heating appliance manufacturers that the newer finishes, with fewer coats and thinner application, can compete favorably when all factors are considered, and, in the long run, add appreciably to the value of the heating appliances with resulting prestige among the ultimate buyers.

Merchandising is coming back

M. F. Cotes, president of the Institute of Cooking and Heating Appliance Manufacturers, in a recent Cincinnati address, stated: "I think most manufacturers will agree that we are now entering a buyers' market, a trend which will be more definite in the second half of the year as we will all be aggressively selling our merchandise by that time. In order to sell our merchandise properly, it is going to be necessary for us to re-educate most of the personnel in our dealers' and distributors' sales organizations, not only on the merits of our own individual products but also on the basic ideas inherent in good salesmanship."

This sound advice for the producers of cooking and heating appliances is equally sound for those whose interests are chiefly porcelain enamel. First, we have the problem of re-educating our own industry salesmen and filling them with enthusiasm for the outstanding improvements that have been made available during recent years. Second, and certainly of equal importance, we have the job of familiarizing the appliance producers and their salesmen with the selling advantages of the latest types of porcelain enamel finishes. Third, if we are to cement our relationship with the cooking appliance producers and re-establish porcelain enamel as the logical finish for heating appliances, we should go even further and launch a worthwhile educational campaign to the wholesale and retail appliance outlets.

These suggestions are not only within the realm of possibility—they should be considered a necessity for the continued growth of our industry.

(Statistics on shipments from ICHAM)

Dana Chase

EDITOR AND PUBLISHER

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Enameling is a fine art

picturing the revival of art enameling—the artists and examples of their work

By Louise Bruner • CLEVELAND, OHIO

finish The rapidly increasing number of American artists who are turning to vitreous porcelain enameling as a fine art promises to be an exciting stimulant for the entire industry. Their ingenuity with color and design point the way to new uses for enamel, and their production of beautiful things is educating people to appreciate its aesthetic as well as useful qualities.

New York City, Cleveland and San Francisco are the present centers for fine art enameling, while a number of excellent craftsmen are working independently all over the country. The great enthusiasm of the buying public for their work, and the encouragement offered by the Syracuse Museum of Fine Art with its annual ceramic exhibition, make the future look even brighter.

Technical advances lead to revival of interest

This revival of interest in enameling in the United States comes after more than a century and a half of inactivity. Technical advances made by industry is the most important cause. Rolling mills provide flat sheet metal, suitable for mural use; copper can be obtained in a pure state; frits are scientifically compounded so their behavior in the furnace can be more accurately predicted; furnace temperatures can be controlled more exactly; and small, portable and inexpensive furnaces are available for studio use. The tedious grinding of glazes, shaping of metal by hand, and gouging out hunks of it for champleve work may have been acceptable to renaissance artisans — but it would be too tedious for the artist today.

When Edward Winter and Harold Tischler returned, in 1934, from their studies at the Kunstgewerbeschule in Vienna, they could count on one hand the artists working in enamel in the United States. As the enamels of such pioneers as these two were exhibited, other artists were encouraged to enter the field. Since the war, European enamelists have come to practice their art here.

A fine historical background

Enameling on metal, as a fine art, goes back to the fourth and fifth centuries B.C., when the Greeks and Romans used the champleve method to embellish their armor and weapons. Since they worked in gold and silver, many of these pieces were destroyed for the precious metals underneath. Cloisonne enamels were made by ancient Chinese and Japanese artists.

The Celts and Saxons did enameling in 240 A.D., and the Byzantines, in the ninth and tenth centuries, made enamel objects for use in their churches. At the time of the Renaissance in Italy, enameling rose from a craft into a fine art. The discovery that successive layers of enamel could be applied without separating made it possible to paint creatively in this medium.

In the fifteenth century Limoges, the art reached a high peak. Studios rather than individual artists turned out pieces that have never been exceeded. Later French artists copied paintings by Watteau and Fragonard on small snuff boxes and other luxuries for the personal adornment of the nobility. But the creative spark began to decline in the eighteenth century. From then, until the present reawakening, little of significance occurred.

Artists today still use the traditional methods of applying enamel, but they make use of the technical improvements and are also discovering new tricks of their own.

Among today's artists

Here are some of the men and women who are making history with their enamel art:

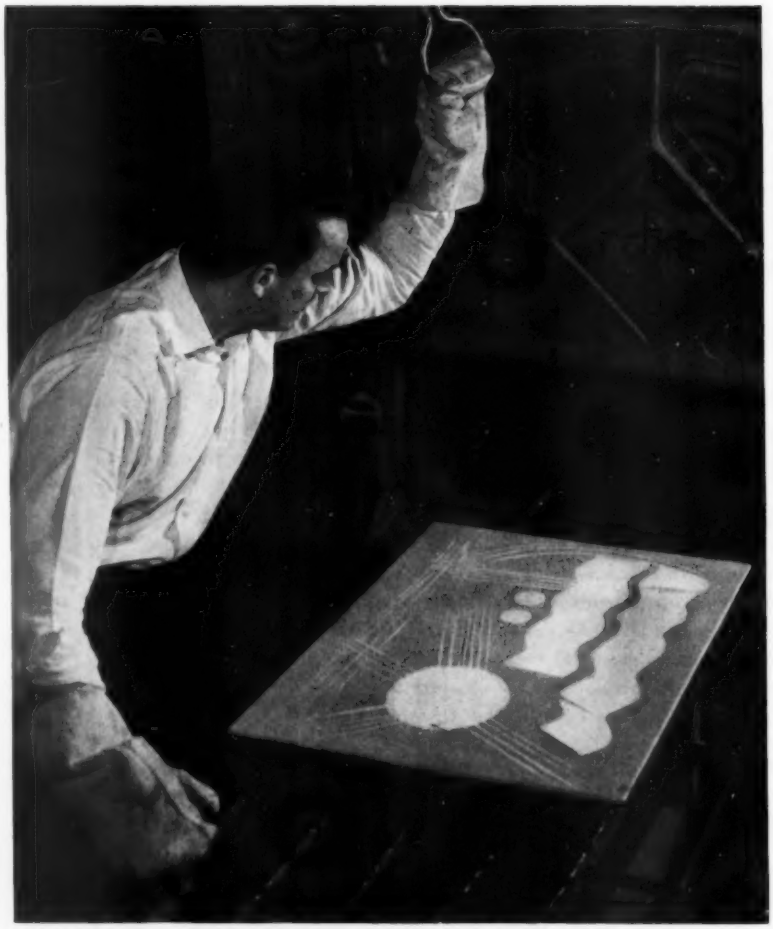
Edward Winter, of Cleveland, develops his designs directly on the enamel, letting the medium itself have free rein. With his training as an artist, and his fifteen years' experience in enameling, he feels this approach helps him to take advantage of the beautiful accidentals in the firing, such as speckles, running of color, hair lines and crackles. He believes that when an artist tries to dictate to enamel as he does to paint,

---

Louise Bruner

The author of this article is a graduate of Denison University, was a social worker in Cleveland and in Key West, Fla., and taught a course in social usage at Cleveland College, Western Reserve University.

She writes the "Martha Lee" advice column for the Cleveland News, does a weekly column of art criticism, and writes for women's magazines.



Having access to large industrial furnaces, Edward Winter is able to turn out large pieces such as the one above.

he loses the essential advantage of this medium.

Winter has access to industrial furnaces and, consequently, his production is greater and his pieces are larger than those of the artist working in a small studio kiln.

It was a natural transition for him to move from candy boxes, ash trays and bowls in transparent glazes on copper to large enamel murals on steel and copper. These murals are undoubtedly one of the most significant developments in this art, for they open a whole new field for decorative enameling.

His seven-foot copper mural, "Animal Kingdom," was shown at the San Francisco Treasure Island exhibit in 1938. Since then he has been using sheet steel — sometimes white enameled table tops, with a turned down flange — to give strength and resist shock. He applies his design in opaque enamel in the consistency of thick cream. The transparent glazes are not suitable for work in steel.

His success with this experiment has attracted the attention of architects, who see in it a material for building facades, elevators doors, store fronts and fireplaces. Decorators are aware of the possibilities of building a room around such a mural incorporated into a building wall.

Winter exhibits in important shows, but he also turns out a large line of useful pieces, which are sold in fine shops all over the country. He is demonstrating that museum quality enamels can be produced on a large scale — if the artist has a large furnace and can work fast. An assistant helps prepare the metal and does the shipping, but Winter does all his own designing and firing.

Karl Drerup, of Compton, N. H., is also Vienna trained. Miss Anna Olmsted, director of the Syracuse museum, says: "He is really the leader in superb enamels." One of his most exquisite pieces is a series of eighteen copper plaques fastened together to form a mural which he calls "Enchanted Garden." It won a $200 prize in the 1941 Syracuse show.

Drerup believes the future of enameling depends on "the amount of abuse which commercialization will inflict on this lovely medium." Although he works on a small scale, his work is important in setting high standards for the art.

Kenneth F. Bates, South Euclid, Ohio, teaches design at the Cleveland School of Art, and makes his enamels in the small kiln in his home studio. Bates is a meticulous craftsman, and is painstaking with details. For an ambitious composition, he renders his design in full color in water color or tempera first. He generally uses enamel ground to 60 or 80 mesh, but often uses 200 mesh, for details, which he suspends in a paste made from oil of sassafras.

The titles of his pieces reveal his source of inspiration: "Doodling with a Platinum Line"; "My Trip to Pittsburgh"; "Hybiscus," a blossom from his prize garden. He was one of twelve faculty members of his school to make grapic impressions of Moussorgky's "Pictures at an Exhibition," which were shown at the concert hall when the Cleveland Symphony Orchestra played this music. Bates chose "The Market Place at Limoges" for his inspiration, and rendered it in enamel. He also does pill boxes and jewelry.

Bates' main contribution to enameling is his ecclesiastical objects. He has made crucifixes, holy water fonts, and triptychs, which are authentic to rubrical law and yet sound in color and design. Clergymen, who share his belief that liturgical art needs improving, have commissioned him to make pieces for their churches.

Charles Bartley Jeffery, director of art in the Shaker Heights, Ohio, public schools, works in his home kiln in the way Bates does. He, too, makes ecclesiastical pieces, jewelry, ash trays and bowls of high quality

and on a small scale.

Mildred Watkins, silversmith, and instructor at the Cleveland School of Art, makes enamel plates with a wide border of transparent glaze to emphasize her design in the center. She is the only known present day artist who uses the plique-a-jour technique in her jewelry. This process is similar to cloisonne, with the metal base removed, and with wire cloisons separating each color. When held up to the light, it is as transparent as a stained glass window.

Harold Tischler, of New York City, who studied in Vienna, is working on a new technique for decorative plaques and fireplace tiles. He is now turning out a gift line commercially, which includes transparents, crackled effects and decorated pieces. During the war he made unique small copper animal pins, which were glazed and decorated. His work won a Silver and a Gold medal in the Paris Exposition of 1937.

He believes enameling is on the upward trend, because it truly fits into modern life. "It takes so little time to care for them compared with metals that tarnish, and they retain their rich and glorious color forever."

Doris Hall Enamel Jewelry is the work of **Doris Hall** and her husband, **Kalman Kubinyi,** who both have reputations as painters and printmakers. They distribute jewelry, from their home kiln, in fine stores here and in South America, South Africa and Europe. Mr. Kubinyi is now building a larger kiln to take care of their increased business. Both he and his wife do gift wares. Doris Hall has also made a few enamel portraits.

She applies her enamel in dry form, dusting on additional colors after the first firing to give her a freer use of the medium. She feels that quality enamels could be mass produced, and consequently less expensive, if artists would pool their resources to buy a large kiln and hire someone to handle business details.

Most artists agree that there would be a loss of quality if they simply turned over their designs to an artisan, for such a worker would not know how to take full advantage of the interesting accidentals that occur.

Lisel Salzer, of New York City, is a portrait painter who became interested in enamels after receiving a Doris Hall pin as a gift. She uses the grisaille technique for her portraits, and scratches her design through a thin layer of white flux, which cannot be found commercially in the quality she requires. Her physician-husband's knowledge of chemistry helped her achieve what she wanted, and she now applies many layers of color after the initial one, finishing with gold. She does not work commercially, but does commissioned portraits for Portraits, Inc., and small decorative pieces for Hammer Galleries.

Lili Taubes, also of New York, and the wife of the painter, Frederick Taubes, used to do large portraits and pictures in enamel, but now concentrates on pins, pendants, earrings and small pieces. She does all the settings and metal work herself, using silver and copper as bases, and applies gold and silver foil. She prepared for this work by studying ancient enamel techniques in Europe.

Ruth Raemisch, Providence, R. I., uses the cloisonne and grisaille techniques for her painted enamels. She is one of the earliest American artists to work in this medium, and she finds enamel is as pliable as paint with the additional luminosity which paint does not have. Most of her pieces are unique and the Metropolitan Museum and Rhode Island School of Design have bought her enamels.

Claire Witt Wyman and **Carl Wyman** are another husband and wife team who teach art in the Cleveland public schools, and make museum quality enamel ash trays, ciga-

Kenneth F. Bates is a meticulous craftsman who makes his enamels in the small kiln in his home studio.

Harold Tischler is working out a new technique for decorative plaques and fireplace tiles. He is now turning out a line which includes transparents, crackled effects and decorated pieces.

ret boxes and plates in their spare time.

On the West Coast, enamelists find Bill Brewer's Pacific Shop a friendly outlet for their wares. **Gertrude Hartman, Margo Ellberg** and **Jade Snow Wong** produce bowls, plates, vases, ash trays etc., commercially, with Miss Hartman also doing jewelry. Most of their work is done in solid, transparent colors with little decoration.

Carlton Hall does not work on a large scale, but he makes fine quality exhibition pieces, and teaches enameling at Mills College, Oakland.

Brewer says the enamel development in the West has made great strides in the last two years, with new recruits constantly turning to enamels for artistic expression.

Calling anyone "first" to do something is always precarious. But to my knowledge, **Mitzi Otten,** of New York, has two "firsts" to her credit. She was applying lumps of frit to her cigaret boxes for a nubby surface texture in 1938, although many artists use the technique now. She also does enameled copper sculpture. Her "Gay Nineties" maiden, shown in Syracuse in 1941, is appealing and soft, in spite of the rigidity of the metal.

The success of many of these artists is due to the far sightedness of certain organizations who have bought their work and promoted public exhibitions of it.

Churches, museums and industrial organizations are promoting enameled art

Outstanding is the job being done by the Syracuse Museum. Their national ceramic show, originated in 1932 by Miss Olmsted, was invited to travel in the Scandanavian countries and in England in 1937. Suspended during the war, the show was revived last November, and started on a nation-wide circuit, which began at the Metropolitan Museum, and stops in Pittsburgh, Dayton, Denver, San Francisco, Los Angeles, Colorado Springs, Portland and Seattle.

Such companies as Ferro Enamel Corporation, B. F. Drakenfeld & Company and International Business Machines Corporation deserve credit for their policy of offering cash prizes for enamel competitions, and for buying pieces for their own collections. So does the Treasury Department's Section of Painting and Sculpture, which commissioned Winter to execute the first enamel mural in the post office at Cassville, Mo. The U. S. Maritime Commission, Washington, D. C., bought a Winter mural; others who own his murals are the Chicago Museum of Science and Industry, and the Metropolitan Museum, while museums in Syracuse, Cleveland and Denver bought his large plaques and plates for their permanent collections.

The annual May Show of Cleveland artists and craftsmen, sponsored by the Cleveland Museum of Art, devotes a large section to enamels. Scripps College, Claremont, California, is now gathering items for its second annual ceramic show, which will stimulate the art on the West Coast. In Cleveland, the non-profit Ten Thirty Gallery offers a permanent sales outlet for enamels by local artists.

Church patronage is becoming an increasingly important factor in encouraging quality enamel art.

Leading stores feature art enamels

Progressive stores are giving the artists an outlet for their enamels by building table settings around them and using them in decorator's rooms. Marshall Field & Co., of Chicago, and The Halle Bros. Co., of Cleveland, have advertised hand made crafts with full page newspaper advertisements, and have invited the artists to appear in their salesrooms and talk to customers and give demonstrations. Other stores doing a magnificent promotion job are the Nieman-Marcus Co., Dallas; John Wannamaker, New York and Philadelphia; Strawbridge & Clothier, Philadelphia; Gump's, San Francisco; George Jenson's, New York; Hudson's, Detroit; Bullock-Wiltshire, Los Angeles; and Amberg-Hirth, San Francisco.

These leading stores demonstrate that enamels offer an opportunity for the American family of average means to own and use objects of museum quality.

See photos of art . Pages 28 & 29

Refrigerated display cases require flexibility in porcelain enameling equipment

enameling parts from ¾″ x 4″ to 14′ x 40″, requiring high inspection standards

By Thomas Moran • ENAMEL PLANT SUPERINTENDENT, C. V. HILL AND COMPANY, INC., TRENTON, NEW JERSEY

finish When C. V. Hill established his refrigerator plant, in Trenton, about a half-century ago, he made the best that could be made, in wood. During the entire period of the trend from wood to present-day steel construction, this tradition of the best has been carried on faithfully and steadily. This makes it imperative for us in the porcelain enamel division to really "hit the ball" on quality. And as we turn out no less than 60,000 square feet of enameled surface each week, in a plant which of necessity is limited in area and scope, we really have to be on our toes.

Not all the steel that is fabricated in this plant is finished in porcelain enamel. But the battery of four fourteen-foot and six eight-foot brakes; four fourteen-foot and two eight-foot shears; arc, spot, and seam welders; and a wide variety of other metal fabricating machines, delivers to us a minimum of 10,000 square feet of 18 gauge steel six times each week, at present rates of production. And, of course, we are not getting our requirements at this time, because of the general scarcity and shortages which hamper business these days. But the point is, the parts must be processed daily, and on schedule. And this we do, for we keep up with assembly, come what may.

Metal fabricating machinery is modern and of a type suitable for our production of a wide range in size and formation. One section of the metal fabrication department is devoted to a well-equipped machine shop for the making of dies and small tools, and to service these items. Metal storage is a bay 60′ x 200′, serviced with side track and overhead crane.

All porcelain enamel produced is used in our own assembly. Sizes range from a tiny switch plate, ¾″ x 4″, to husky 14′ x 40″ pieces. For such variation, our equipment — and our operators — must be versatile.

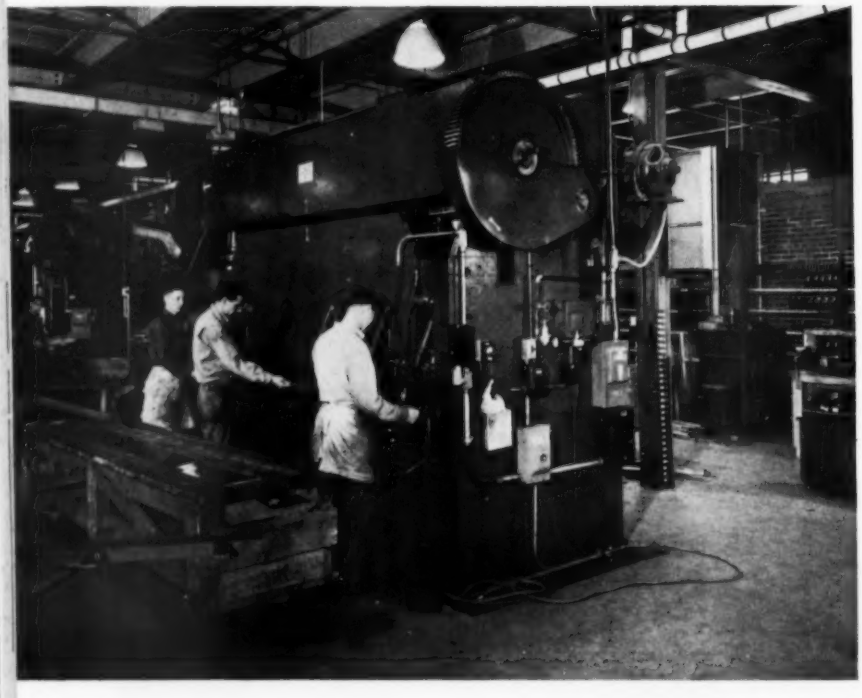
In the pickle room, two men, on each of two shifts, keep abreast of the flow. Usual sequences are followed: two cleanser tanks, rinse;

to Page 20 →

See photos . . . . Pages 18 & 19

Large spray booths required for the exceptionally long sections which are typical of display case construction. These are dry type booths with ample exhaust systems.

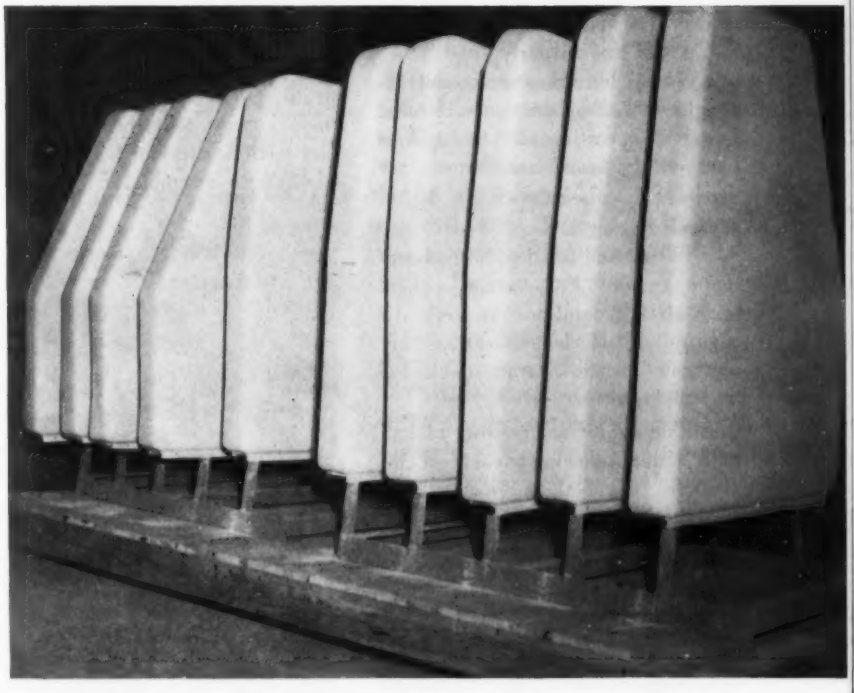
Here is a partial view of the metal fabrication department. The fabricated pieces stacked on the truck in the foreground are part of the corner sections for some all-steel walk-in coolers.



This double ram press break is used mainly for punching and notching. It is capable of handling sheets up to and including 12′ in length. The bed on this break is 30″ wide.

This photo shows the method of loading fabricated parts in pickle baskets. The hoist operator is transferring a load of ware from the No. 1 to the No. 2 cleaner tank.

A truck load of parts in finish coat bisque is entering the room-type double-end drier which is heated with gas to 350° F. As floor truck is pushed into drier, it forces a truck from the opposite end.



Large display case end panels mounted on the hanging racks of especially designed handling truck. Mounted on 5" rubber casters, this truck is moved about by using hand hooks.

A load of fired ware comes from one of the two box type furnaces in the C. V. Hill plant. The furnace in the foreground is gas fired while the other is electrically heated.

acid tank, rinse; then a nickel dip, followed with neutralizer. Tanks are 5′ x 5′ x 14′. Baskets are lifted by monorail hoist. Small parts are placed in separate baskets set inside the larger one.

Ground coat tank has circulating system

Ground coat, conditioned in a circulating tank equipped with pump and magnetic separator, is flowed on manually. Ground coat dryer is kept at temperature with exhaust heat from a radiant tube, gas-fired furnace.

In addition to the radiant tube, gas-fired, 6′ x 14′ furnace, a 5′ x 12′ electric is in service. Double unloaders and specially designed burning racks, particularly high "A" types, keep burned ware output coordinated with production schedules. Furnace operation is twenty-four hours straight, and temperatures are maintained at 1540° F.

Black edging is applied over dry ground coat and fused with one burning operation. For certain applications black ground coat is used. All edging and black applications are segregated, small separate booths being employed.

Milling equipment consists of ball mills of the following capacities: two 1000 lb., one 500 lb., one 200 lb., and one 100 lb. There is, of course, a battery of jar mills for colors and for tests.

Superintendent's office is control point

All controls are located in the superintendent's office, adjacent to the laboratory. A thickness gauge, a reflectometer, a conveniently-located laboratory furnace and many other necessities for quality control are here.

The real emphasis on quality control in this plant is not on scientific instruments, no matter how infallible, but on good, old-fashioned, careful and pains-taking efforts and close attention to details on the part of the fifty employees of this department. "Good housekeeping" is stressed. Neatness and cleanliness are the order of the day. To one man is assigned the job of washing and repairing racks. Another mends gloves and keeps essential items in repair, ready for use when needed, and *clean*.

One especially trained operator is the "Doctor" who in a little "Hospital," salvages the pieces which have met with mishap. These can usually be salvaged so effectively that they pass the close scrutiny of all personnel, in a plant where our slogan is "Be your own Inspector."

Special transport trucks for end sections

Anyone familiar with refrigeration case construction knows well the difficulties connected with processing some of the larger pieces. Long reflectors, tops which must be level or no count, fronts, etc., provide us with problems. A special type of truck body is used to transport the large end sections through the plant, from pickling to assembly. This piece of equipment is so designed that the end sections can be quickly loaded and, once in position, will not rock, sway, or fall off. Thus, easy processing of an awkward-to-handle piece is safely and easily done.

As previously stated, the parts required to build a Hill refrigeration case are many and varied. Meat platters, which we produce in quantity, require particularly close inspection.

Prominently displayed in the porcelain enamel division is this sign: *"We shall do good work; at a profit if we can; at a loss if we must; but always good work."* You may believe we do not intend to do it at a loss, and we are not going to. So the alternative is *always good work.*

When it becomes possible to build — when proper materials and equipment are available — expansion is planned that will also enable us to do *more* work.

"THIS WILL MAKE A NICE FISH STORY."

Lithium compounds

in porcelain enamel compositions

By Dr. Paul A. Huppert • LISK MANUFACTURING CO., LTD., CANANDAIGUA, NEW YORK

Part II

Exclusive feature finish

Lithium ground coats and thermal shock resistance

According to the investigations by F. A. Petersen [8] and G. H. McIntyre[9], thermal shock resistance of enameled cooking utensils can be favorably influenced by increasing the coefficient of expansion of ground coat, and by decreasing the coefficient of expansion of cover coat enamels.

Practical experiments indicate that ground coat frits containing lithium manganite, with and without lithium cobaltite, influence the thermal shock resistance in the same way as ground coats of highest expansion coefficient. The small amounts of lithia present in these enamels, and the factor 2.0 as coefficient of expansion, can not sufficiently increase the *calculated* coefficient of expansion to explain the improved thermal shock resistance of this type of enamels.

Exact measurements of the cubical expansion coefficient were made on the same ground coat frits, one ("SR", a non-lithium ground coat) smelted with manganese dioxide, and one ("L") smelted with lithium manganite. The result was that the coefficient of expansion changed from 289 to 295 x 10^{-7}. (See Page 22.)

The difference of cubical expansion coefficient is quite appreciable, and proves that the figure 2.0 by Winkelmann and Schott can not be applied under these circumstances, and that the improved thermal shock resistance, at least in part, is due to the increase in the actual coefficient of thermal expansion.

It has to be assumed, therefore, that either the factor 2.0 is not correct in these combinations, and lithia actually increases thermal expansion of enamels far more than any factor in a simple additive calculation can express; or it might be that other properties are strongly changed in enamels containing lithium manganite, such as elasticity, tensile strength, adherence, and the like, which may account for the obvious improvement.

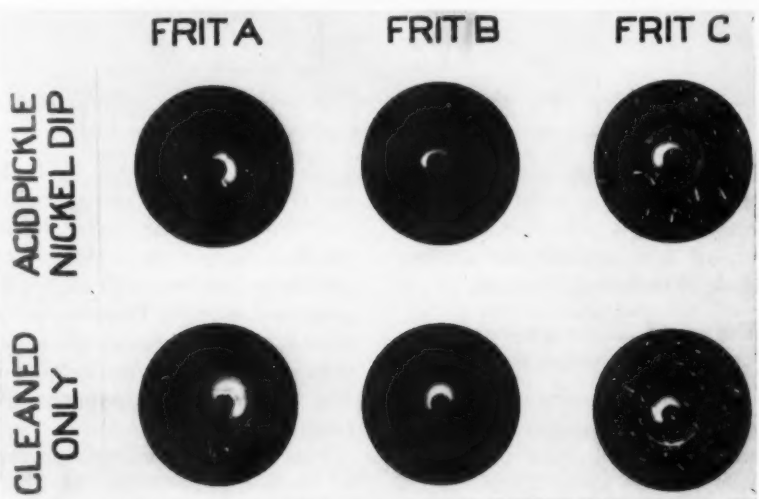
Some of these facts are in contradiction to some of the reports quoted in the early part of this article. They are, however, in accordance with the findings of L. Navias, and Waterton and Turner, that lithia is as effective as Na_2O in promoting high expansions.

There is also a possibility that lithium manganite and/or lithium cobaltite react differently in different glass or enamel compositions, and more research will be required to give the correct theoretical answer to this problem. As far as the practical use is concerned, we have to be satisfied at present with the actual effect of lithium-bearing ground coat enamels on thermal shock resistance.

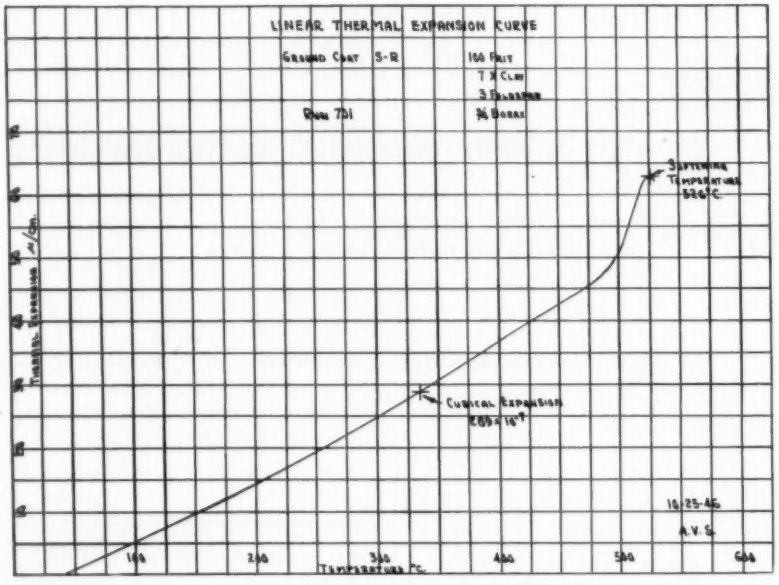
Elimination of nickel flash by using lithium ground coats

It has been found that nickel flash, heretofore essential for developing a perfect bond with some ground coat frits, is not needed when introducing lithium manganite and/or lithium cobaltite in the formula. Adherence was essentially the same within the limits of our present means of qualitative testing.

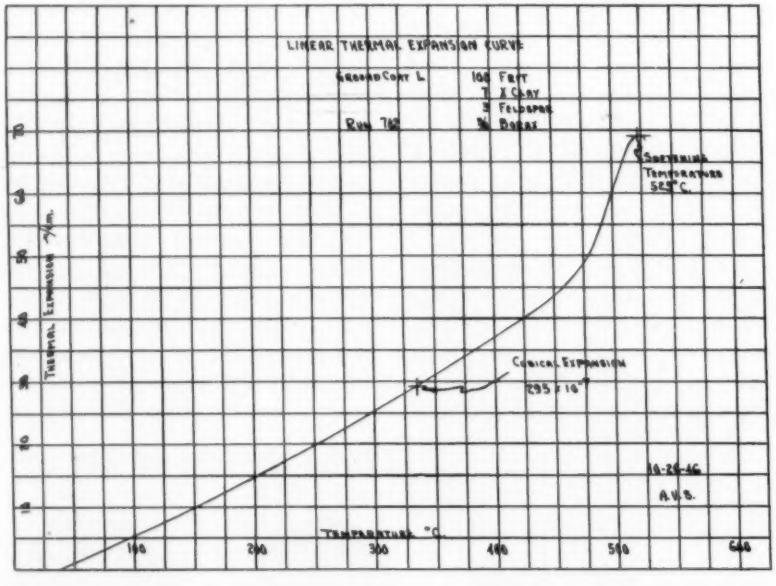
For the experimental work, the P.E.I. falling weight test, the simple ball peen hammer test, and the E.U.M.C. impact test on ground coated as well as on the finished ware have been used. Although these testing methods do not produce results of quantitative values, it could be judged that the bond produced by



Figures show degree of adherence after testing procedure. Lithium-bearing ground coats were used on metal prepared with and without nickel flash.



Here we see the linear expansion of milled mixtures. Chart above covers non-lithium ground coat; below, lithium-bearing ground coat.



lithium manganite on ground coats, without using a nickel flash, was equivalent to non-lithium containing ground coats applied after a nickel flash, as commonly practiced.

The use of lithium ground coats on various types of steel

All of the foregoing work was carried out on a commercial scale on ware fabricated from light gauge steel common to the kitchen utensil industry. However, in addition, test pieces (6″ x 4″) of varying gauges heavier than No. 23 gauge were enameled with ground coats C, D, F, and G *(see Table of Comparison under "Discussion of Results")*. Results on these heavier gauges were comparable to those obtained on No. 23 gauge and thinner. Thus, the use of these lithium-bearing enamels is not confined to light gauge metal, but may be considered as having a wide range of application.

Steel samples of different sources of non-enameling stock and of titanium-bearing steel, which caused blistering when enameled with various commercial ground coats, were tested with lithium-bearing ground coats and resulted in a perfectly smooth finish. No blisters could be observed either in ground or in cover coat, and the bond test was satisfactory.

Lithium compounds as mill additions

Various tests were run to evaluate lithium manganite as a mill addition for commercial frits. In general, results were similar to those obtained through the use of lithium manganite as a smelter addition. In some cases, however, the workability of the enamels underwent considerable change. It seems that some reactions between the traditional mill additions and the lithium manganite take place which make certain changes necessary for faultless application, especially for dipping.

Single coat enamels

As some single coat enamels are partly colored ground coat enamels of special characteristics, the addition of lithium compounds has its possibilities for such purposes too. The results which can be obtained with ground coats indicate some characteristics which can be of importance to finish coats. Thus, surface hardness and acid resistance can also be influenced by the presence of lithium compounds.

Lithium cobaltite

The lithium compound of second importance to the porcelain enameler seems to be the lithium cobaltite. Good results might be obtained by combining the addition of lithium manganite and lithium cobaltite. The optimum amount of lithium cobaltite, so far found, was about one-half of the regular addition of cobalt oxide. The presence of a small amount of nickel oxide seems desirable. These investigations will, however, be continued.

IV. Discussion of results

The comparison of formulae in the Table of Comparison reveals that an equilibrium between the amounts of SiO_2-B_2O_3-Li_2O can be reached so that even basically harder frits can be fired at lower temperatures in the

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Division program report

A. C. S. forty-ninth annual meeting

(continued from June, 1947, finish)

with comprehensive authors' resumés of division papers

Quantitative spectrographic analysis of powdered ceramic materials

By J. M. ZANDER AND J. H. TERRY

The rigid control of quality in the production of porcelain enamel frit has been aided through the use of the spectrograph for rapid chemical analysis. Ceramic materials which formerly required as long as several days to analyze are now checked in two to three hours with this instrument. The adaptation of the instrument to the quantitative analysis of these materials has required the development of methods for the direct determination of constituents which are present in concentrations varying from a few per cent to as high as eighty per cent.

The methods which are described in this paper are based on the use of briquetted samples. The powdered material to be analyzed is mixed with a flux and graphite in carefully measured portions, and then pressed into pellets. Two pellets are made by dividing each sample mixture before pressing. These pellets are sparked on the spectrograph, and duplicate samples of a chemically analyzed standard of the same material are recorded on photographic film. A critically damped discharge, using the Applied Research Laboratory Multisource unit, is employed in sparking. The density of the spectrum lines, which is dependent on the amount of each element present, is determined, and calculations are made using the internal standard method.

There are many variable factors which must be carefully controlled. Among these are particle size, mineralogical characteristics, sample preparation, mixing, briquetting and excitation conditions. The use of a standard with each new sample allows for any drift in the working curves from which calculations are made.

The accuracy obtained by these methods has proved satisfactory for the quality control of ceramic raw materials. The analysis of constituents present in large concentrations has been possible through: (1) The very careful control of variable factors. (2) The tendency of working curves for these constituents to be relatively flat. (3) The application of these methods to narrow ranges of variation in the composition of repetitive shipments of the same material.

The authors feel that a start has been made in the application of this instrument to the rapid analysis of ceramic materials, and offer this paper as a basis for further study on the part of other investigators.

Ceramic materials formerly requiring as long as several days to analyze are now checked in two or three hours with this spectrograph. Equipment provides both speed and accuracy in the analysis of materials.

Super opaque enamels of low SiO_2 content

By W. J. BALDWIN

In the laboratories of Titanium Alloy Manufacturing Company considerable research and development work has been done in the past on super opaque enamels, both of the antimony and zirconium opacified type. More recently during the past five years certain novel compositions have been developed that appear to warrant further consideration, and the preliminary investigations on these types are presented.

TABLE I.

PROPERTIES OF ENAMEL COMPOSITION TESTED

Series 4

		Reflectance Value		Resistance	For 1520° F. Firing	
No.	*Color*	*1520° F*	*1560° F*	*to 10% Citric*	*Finish*	*Gloss*
1A	White	83.5	84.0	OK	Good	Good
1B	"	79.6	83.6	OK	Good	Fair
1C	"	80.6	81.4	OK	Crazed	Fair
1D	"	85.4	85.4	OK	Good	Fair
1E	"	83.2	82.6	OK	Good	Fair
1F	"	78.3	78.4	S.S.	Crazed	Poor
2A	Cream	81.5	82.6	Etched	Crazed	Good
2B	White	83.8	84.0	"	Good	"
2C	Cream	79.4	80.2	"	Pitted	"
2D	White	77.4	79.6	"	Good	"
2E	White	83.2	82.2	"	Good	"
2F	*	*	*	"	Crazed	"
3A	White	81.4	82.9	"	Good	Good
3B	Blue White	66.4	70.2	"	Brown Spots	Good
3C	Blue	57.2	67.2	"	" "	Fair
3D	Blue	59.2	67.3	"	" "	Poor
3E	White	82.6	81.6	"	Good	Good
3F	White	75.5	75.8	"	Brown Spots	Poor
4A	Yellow	60.8	54.6	"	Good	Good
4B	"	72.9	*	"	Good	Good
4C	"	52.9	*	"	Crazed	Fair
4D	"	68.3	66.4	"	Crazed	Fair
4E	"	67.0	64.2	"	Good	Good
4F	"	49.7	*	"	Crazed	Fair
5A	Lt. Yellow	60.4	38.1	"	Good	Good
5B	" "	64.8	66.2	"	"	"
5C	" "	60.8	41.5	"	"	"
5D	Yellow	72.6	68.4	"	"	"
5E	Yellow	71.3	69.2	"	"	"
5F	*	*	*	*	*	*
6A	Grey	14.4	14.3	Etched	Good	Fair
6B	"	12.8	14.0	"	"	Fair
6C	"	15.8	19.1	"	"	Fair
6D	"	11.6	15.3	"	"	Good
6E	"	12.0	30.0	"	"	Good,
6F	"	16.6	16.4	"	"	Fair

*Severe crazing resulted in enamel lifting off and no data were obtained.

TABLE II.

FORMULA WEIGHTS & PERCENTAGE COMPOSITION OF THOSE ENAMELS SHOWING BEST COLOR, GLOSS & FINISH

	1E	2E	3E
Dehydrated Borax	14.45	14.45	14.45
Nitrate of Soda	1.86	1.86	1.86
Alumina Metaphosphate	24.78	18.60	12.39
Pyrophyllite	5.70	19.67	18.20
TAM G. Zircon Milled	9.23	9.23	9.23
Alumina Hydrate	21.13	10.00	20.10
Zinc Oxide	6.00	6.00	6.00
Lithium Carbonate	7.40	7.40	7.40
Cryolite	7.00	7.00	7.00
Sodium Titanium Silicate	12.66	12.66	12.66
Calcium Carbonate	3.57	3.57	3.57
Potassium Carbonate (85%)	3.44	3.44	3.44
B_2O_3	10.0	10.0	10.0
SiO_2	10.0	20.0	20.0
Al_2O_3	20.0	15.0	20.0
P_2O_5	20.0	15.0	10.0
Na_2O	9.0	9.0	9.0
Li_2O	3.0	3.0	3.0
ZnO	6.0	6.0	6.0
Na_3AlF_6	7.0	7.0	7.0
TiO_2	5.0	5.0	5.0
CaO	2.0	2.0	2.0
K_2O	2.0	2.0	2.0
ZrO_2	6.0	6.0	6.0

The most promising compositions as judged by finish, gloss, acid resistance and reflectance values, developed by previous investigators in TAM laboratories were selected and basic compositions derived from such data.

Results of enameling trials made are shown in Table I. Ratio of SiO_2:Al_2O_3:P_2O_5 is of importance with respect to reflectance values obtained, color of the fired enamel and acid resistance — the best range is found to be 10-20 SiO_2, 15-20 Al_2O_3, and 10-20 P_2O_5. Compositions as shown in Table II were found to be the best.

It was found that with this ratio of oxides high reflectance values could be obtained with 5% TiO_2 as batch constituents. With high SiO_2, low Al_2O_3 and P_2O_5, increase of TiO_2 content was necessary for obtaining higher reflectance values.

The use of lithia Li_2O is not entirely necessary, compositions being made up that were quite satisfactory. The use of Li_2O does, however, impart considerable fluidity to the resulting enamel.

Novel enamel compositions capable of producing reflectance values of 80-85% at application weights of 40 grams/ft² have been described. These compositions are characterized by high Al_2O_3 and P_2O_5 with SiO_2 content being low, the optimum ranges of these constituents being: 10-20% SiO_2, 15-20% Al_2O_3, and 10-20% P_2O_5.

Optimum white color of the fired enamel is obtained when Al_2O_3 is in excess of P_2O_5 although acid resistance is impaired. When P_2O_5 and Al_2O_3 are equal (20%), and silica low (10%), acid resistance is obtained. The color of the fired enamel, although not as white as obtained with Al_2O_3 in excess of P_2O_5, is, however, a satisfactory white.

The amount of TiO_2 used as the opacifying agent in this type of enamel formulation may be minimized through the proper balance of SiO_2: Al_2O_3:P_2O_5, 5% TiO_2 being sufficient for optimum opacity.

The use of zirconium oxide (ZrO_2) as a batch constituent is of definite advantage in improving finish and

gloss. No detrimental effect on acid resistance is to be noted through its use.

This investigation is by no means completed. Further work on these types of compositions is under investigation, and will, it is hoped, be presented at a later date.

Physical characteristics of super-opaque porcelain enamels

By P. C. Stufft and G. H. Spencer-Strong

A comparison was made of the physical properties of commercial types of titanium, antimony and zirconium-opacified super-opaque covercoat enamels. Reflectance, color characteristics, torsion resistance, impact resistance, abrasion resistance, molten fluidity and corrosion resistance were compared.

Titanium-opacified enamels were found to be definitely superior to antimony and zirconium-opacified enamels in regard to torsion resistance, abrasion resistance, scratch resistance and opacity or covering power.

The outstanding characteristic of the titanium-opacified enamel is its high coefficient of scatter, that is, a rapid development of maximum opacity at minimum application weight. Titanium enamels are also found to be superior in regard to acid resistance, in view of the fact that the commercial titanium enamels of the super-opaque class have excellent acid resistance, whereas zirconium-opacified enamels have no acid resistance, and highly acid-resistant antimony enamels are limited to the opaque classification of reflectance.

Titanium-opacified enamels are found to be considerably superior to zirconium and antimony-opacified enamels in regard to scratch hardness, abrasion resistance and torsion resistance. They are, however, slightly less resistant than the antimony and zirconium-opacified enamels to impact when applied either over a radius or over a flat surface. The superior hiding power characteristics of the titanium-opacified enamels were demonstrated by spectrophotometer curves showing the reflectance ovet the visible spectrum of the three types of enamels applied at various application weights over a red base coat. These tests showed that the titanium enamel completely obliterated the base coat at an application weight of less than 30 grams/sq. ft., while application weights in excess of 80 grams/sq. ft. for either of the other two types of enamels were required to hide the base coat.

The color characteristics of the three enamels were discussed, and the fact that the basic color of each enamel is a function of the enamel and a distinct entity unto itself was pointed out.

A survey of the expansion characteristics of the three types of enamels showed that the titanium enamels have a somewhat lower linear coefficient of thermal expansion than either the zirconium or the antimony-opacified enamels. However, the difference in linear coefficient of thermal expansion did not appear to be sufficiently great to explain some of the variations in physical characteristics of the enamels, as for example, the warping of panels and the like.

The effect of time upon the fusion flow characteristics of the three types of enamels at temperatures of 1400, 1450 and 1500° F. was discussed. These data showed graphically the much greater viscosity of the titanium-opacified enamels, especially at lower temperatures. This characteristic is believed to be in large measure responsible for some of the phenomena which have been previously attributed almost entirely to coefficient of expansion.

It is indicated, therefore, that the titanium-opacified enamels are greatly superior to the two other types in regard to reflectance and hiding power, and that the zirconium enamel is superior to the antimony enamel in these characteristics. Titanium enamel is superior to the other two types in torsion resistance, abrasion resistance, scratch resistance and acid resistance. The zirconium enamel is somewhat more resistant than the antimony enamel

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Table of Comparison of Physical Properties of White Covercoat Enamels

Item	Enamel Opacified by		
	Titanium	Antimony	Zirconium
Commercial Application	18-25 gm/ft.²	45-50 gm/ft.²	38-45 gm/ft.²
Maximum Reflectance at	25 "	150 "	75 "
Commercial Reflectance	76 to 85%	73 to 75%	74 to 79%
Maximum Covering Power at	–30 gm/ft.²	±80 gm/ft.²	80 gm/ft.²
Torsion Resistance at .009"	40.96° ± .88	31.58° ± 2.68	32.45° ± 0.63
.015"	32.93° ± .60	24.03° ± .65	27.03° ± .78
Impact Resistance ½" Radius* 20 gms/ft.²	20.5"	25.2"	24.3"
40 "	22.1"	26.5"	28.3"
Flat** 40 "	10.2"	12.0"	12.2"
Abrasion — P.E.I.	76%	67.5%	66.3%
Abrasion — Taber (Loss after 16,000 Rev.)	1 coat .0052 gms.	.1182 gms.	———
	2 coats —	.0102 gms.	———
Acid Resistance (P.E.I.)	B to AA	C to B***	D

* Falling Ball E.U.M.C. test. **One-pound pendulum.

***Super-opaque antimony enamels only — opaque antimony enamels having a reflectance of 60 to 68% show A-AA.

ICHAM mid-year convention

cooking and heating appliance manufacturers discuss current problems

THE usual mid-year meeting of the Institute of Cooking and Heating Appliance Manufacturers got under way at the Netherland Plaza Hotel, Cincinnati, on Monday morning, June 2, and included a three-day program. While Tuesday morning was devoted to a general session, the remainder of the time was devoted to group meetings of the various divisions such as electric range, gas range, space heater, oil and solid fuels; specialized groups such as credit managers, financial executives and accountants, labor relations officials, sales and advertising executives, and special committees.

Frank Rising

Purchasing, merchandising and labor relations

Following the president's report to the Institute, the general session program was headlined by three speakers. Raymond S. Reed, home furnishings merchandise manager, Associated Merchandising Corporation, spoke on "The Merchandising Outlook for Major Appliances"; Frank Rising, general manager, Automotive & Aviation Parts Manufacturers, Inc., discussed "Where Do We Go From Here in Labor Relations?"; and L. W. Scott Alter, president, American Tool Works Company, gave procurement advice in a talk entitled "Purchasing at the Management Level."

President reports on production

M. F. Cotes, Institute president and executive vice president of Motor Wheel Corporation, Lansing, Michigan, opened his talk with brief statistical information on appliance production. He pointed to gas range production of slightly over 180,000 units per month during the first quarter of 1947 as compared with approximately 2,000,000 units produced during the "base period" from July 1, 1940, through June 30, 1941, or an average of 165,000 units per month.

M. F. Cotes

Raymond S. Reed

He reported an even sharper advance in electric range production — from a monthly average in the base period of 46,000 units and a yearly production of 556,000 units, to a monthly average of 66,000 units in the first quarter of 1947, or an annual rate of approximately 800,000 units.

Said Mr. Cotes, "If the rate of production which prevailed in the first quarter of 1947 is continued throughout the year, the total number of cooking appliances produced of all types will be approximately 10% above base period levels."

L. W. Scott Alter

As a word of caution, he added, "In spite of the backlogs of orders which the manufacturers are still reporting, it is my opinion that we are now entering into a buyers' market rather than a sellers' market . . . "

Among the other points covered in the president's report were merchandising, labor relations, inventories and material procurement. In connection with the latter subject he cautioned, "The purchasing department in cooperation with management should now balance its inventory on a basis that will protect the financial position of the corporation, and at the same time insure the continuance

of good relationships with suppliers. Suppliers are just as important to any manufacturer as his own customers to whom he sells the finished product."

Labor relations discussed

In his discussion of labor relations, Frank Rising said: "Most of us like to be optimistic about the eventual outcome of controversial problems. In the practice of labor relations, this is the rule. Nearly everyone hopes that our worst conflicts are behind us, and that the future will hold more peace, more progress, more constructive thought and effort.

"Yet few of us are willing to subject our hopes in this respect to the cold light of reason and analysis based on actual experience. If we were, we would see all too clearly that we have made little, if any, progress in solving the basic perplexities of our labor relations structure. We would see that there are areas of conflict wherein two opposing creeds are brought face to face, and that in such areas we have been helpless to effect lasting solution."

After a further presentation of the problems of labor and management, Mr. Rising continued: "To progress toward our goals, we need a revival of articulate, well-reasoned, persuasive self expression. We need to carry our principles and beliefs to the people, openly and forcefully. We need to meet sophistry with blunt, hard facts. We need to sell and resell the essential truths of our competitive, profit-seeking economic system. . . .

"The public, the employee, the politician, the union member and the independent worker alike could benefit from more outspokenness on the part of intelligent business management. Surely it is time that we make clear, at least, that we cannot gain a higher standard of living without working for it, that government cannot give anything to its citizens without first taking it away from them, and that true understanding between employer and employee will not come about until the truth or falsehood of a few fundamental economic facts are definitely established.

"On the whole, this latter point is the most important one in labor relations, and we will have to prove again that economic law does not change, even though many may wishfully think and hope that it does. To that task of re-education management should be dedicated, and the hard job of following through on it is perhaps the most difficult we have ever faced.

"We can do it, if we really want to."

Importance of purchasing

The spotlight was turned on purchasing problems by Mr. Alter as he pointed to such problems as inventory balance and sound production programs which have a stronger background than "intuition or wishful thinking."

In outlining the responsibility of management in the purchasing program, he said, in part: "In setting up his schedules, the top manager of a plant must study the flow of incoming orders and the existing backlog of orders, and then try as best he can to anticipate what future trends are likely to be. He should be in a better position than anyone else in his organization to forecast future trends because he has broader contacts outside of the company and frequently has time available to him for keeping posted on the general economic condition of the country as a whole. He also has many subordinates in his organization with whom he can consult and try to evaluate their ideas to avoid any apparent conflicts."

Divisions hold extensive sessions

Emphasis at this meeting was on

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Finishfoto showing stove men in attendance at the president's reception and dinner.

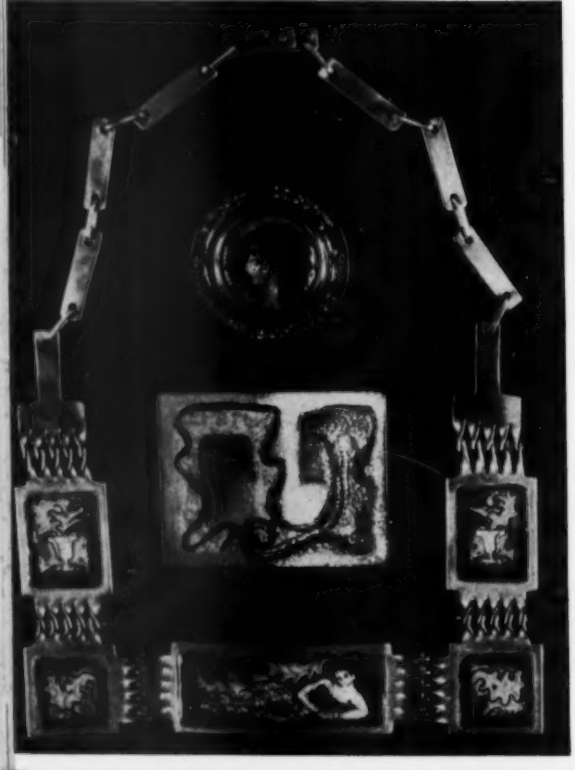
TYPICAL EXAMPLES OFEN

(See "Enameling Is a Fine ,"

MITZI OTTEN'S "Gay Nineties" maiden, shown in Syracuse in 1941, is an enameled copper sculpture, appealing and soft in spite of the metal's rigidity.

RUTH RAEMISCH is represented by this group of enamels. The upper right piece represents the cloisonne technique, the lower right piece the grisaille method.

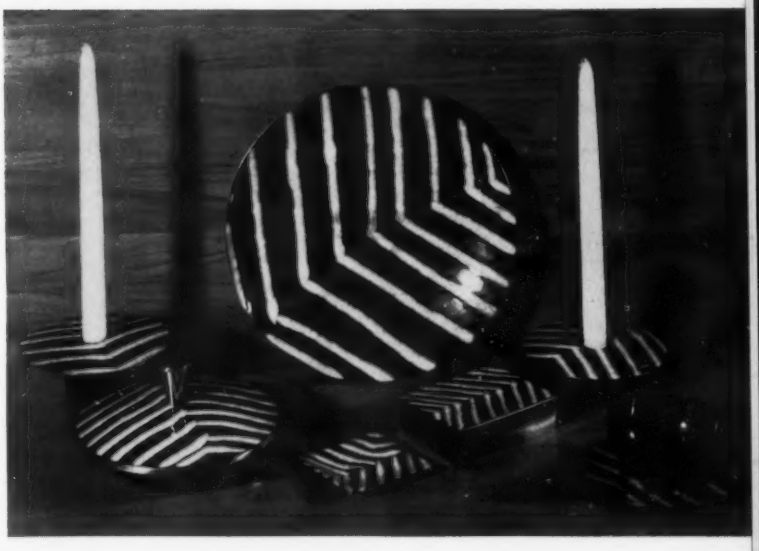
DORIS HALL won a first prize with this group of enameled jewelry at the 28th Annual May Show at the Museum of Art in Cleveland.



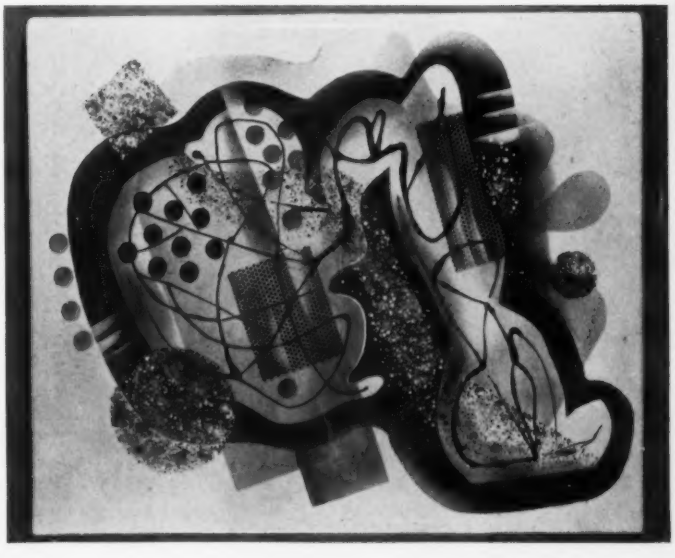
KARL DRERUP, a Vienna trained artist, made this enameled copper bowl decorated with blue fish, considered one of his most exquisite pieces.

OFENAMELED ART

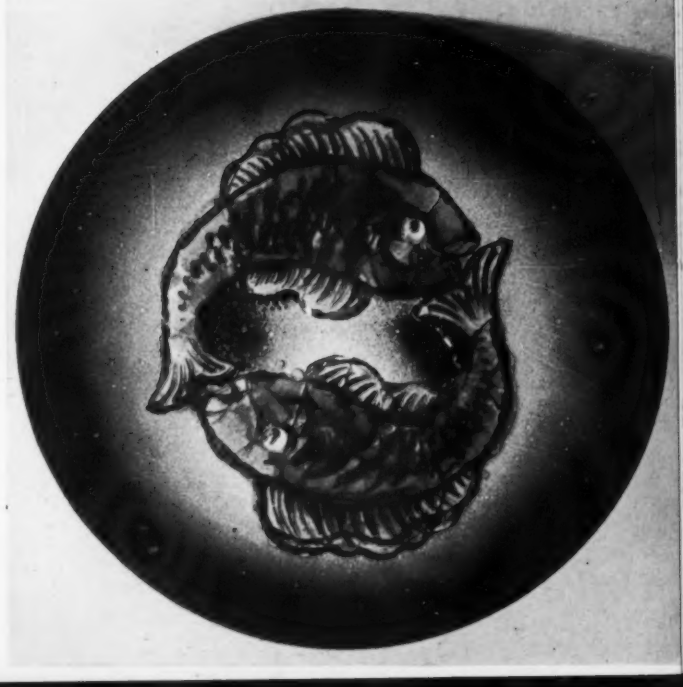
ne 4," page 13)



EDWARD WINTER, an artist with 15 years' enameling experience, developed the zebra striped ornamental objects on the right. His "Abstraction," center right, was done in pink, grey, black and white.



KENNETH BATES, who is interested in improving liturgical art, made the above pieces which are authentic to rubrical law, yet sound in color and design.



HAROLD TISCHLER, who studied in Vienna, produced the decorative plate at the right. He used a raised enamel technique which gives a three dimensional effect.

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As uniform in quality and performance as the rotation of the earth . . . as continuous in production as night following day. . . a constant stream of the World's Finest frit . . . from six wholly continuous smelters* in the only wholly continuous smelter plant in the entire enameling industry . . . for a better finish and greater profits! A standard for the whole world!

**Pemco holds these patent rights on the only wholly continuous smelter #2,323,930; 2,262,029; 2,262,070; 2,248,877; 2,137,931; 2,137,930*

PEMCO CORPORATION

BALTIMORE 24, MARYLAND

"ALWAYS BEGIN WITH A GOOD FINISH"

Central enamelers meet at Clyde plant

new club officers elected

MORE than a hundred members of the Central District Enamelers Club visited the two plants of Clyde Porcelain Steel Corporation, Clyde, Ohio, May 16. Some of the members came from as far as Erie, Pa.

During the day the enamelers inspected both of the company's plants as well as its new office building. The men were split into groups of about 15 with plant supervisors as their guides. This was the first opportunity for many of the visitors to see the rebuilt plant. *(See articles in finish, September and October, 1946, for description of Clyde Porcelain Steel's new plant.)*

The enamelers viewed the complete production of table tops and leaves in Plant No. 1, from stamping out through the silk screening process. They inspected the continuous Veos tile furnace, and saw the firing of various tub shapes. In Plant No. 2 they saw the complete conveyorized assembly of washing machines.

Following the tours of the plants, the enamelers dined at the Fremont hotel as guests of Clyde Porcelain Steel. In the absence of R. R. Trubey, Andy Grierson, vice president in charge of manufacture, welcomed the group.

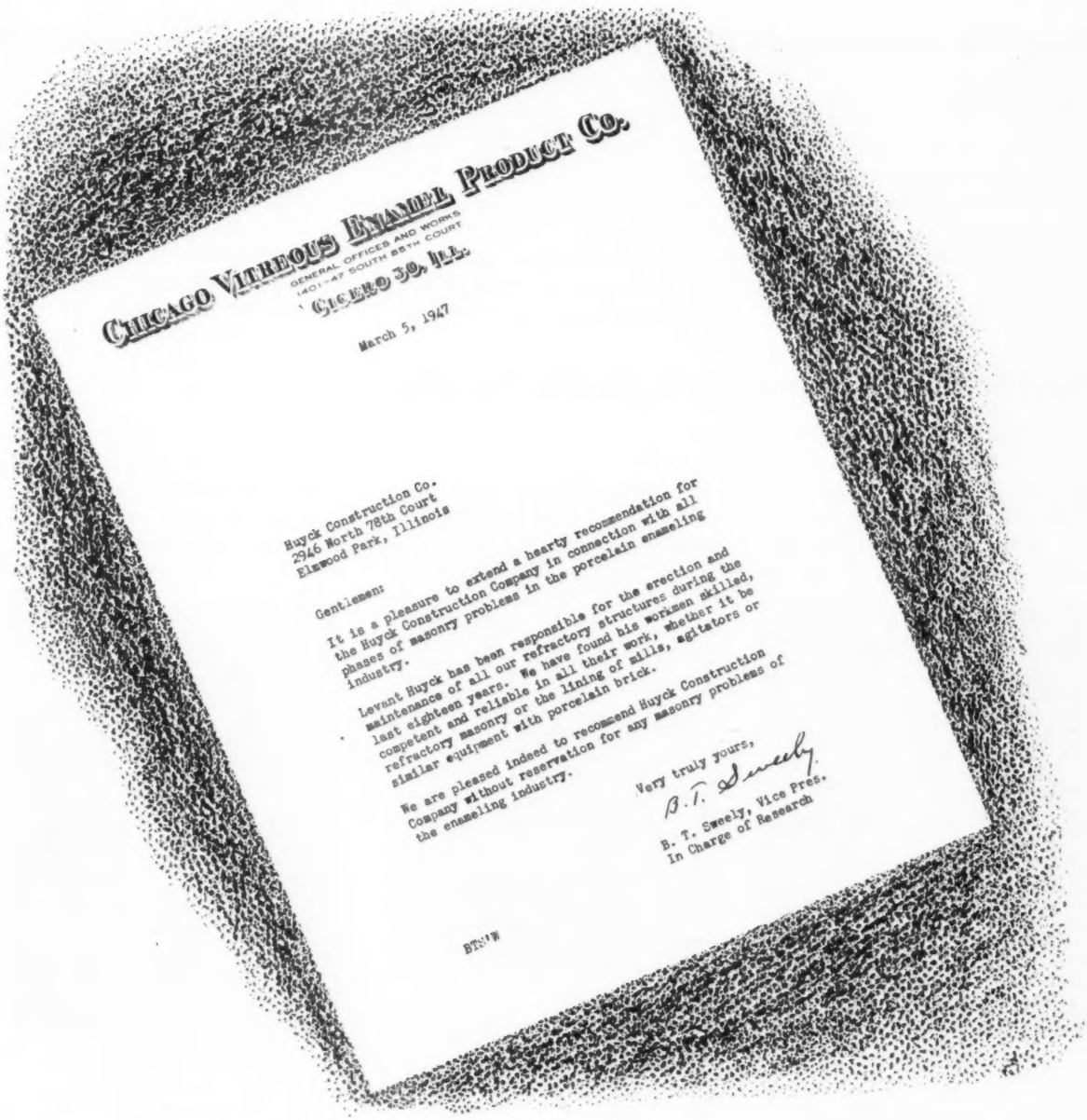
Dan Meeker, The Toledo Porcelain Enamel Products Co., presided at the meeting at which the following new officers were elected:

J. S. LeMunyon, Tappan Stove Co., Mansfield, president; John Lannon, Westinghouse Electric Corp., Mansfield, vice president and program chairman; Paul Cecil, Strong Manufacturing Co., Sebring, vice president, and M. J. Bozsin, Ferro Enamel Corp., secretary-treasurer.

Left: A. R. Grierson, Clyde Porcelain Steel Corp., listens as Dan Meeker, retiring president of the Central District Enamelers Club, addresses the group.

Right: Dave Morgenthaler, Ervite Corp., and Harold Brenner, B. F. Drakenfeld Co., Inc., read The Porcelain Trade, *C. P.S. employee publication.*

Above: Pete Beier, Toledo Porcelain Enamel Products Co., and Don Goetchius, Ferro Enamel Corp., carefully inspect an Irwin "slump tester."



CHICAGO VITREOUS ENAMEL PRODUCT CO.
GENERAL OFFICES AND WORKS
1401-47 SOUTH 58TH COURT
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March 5, 1947

Huyck Construction Co.
2946 North 78th Court
Elmwood Park, Illinois

Gentlemen:

It is a pleasure to extend a hearty recommendation for the Huyck Construction Company in connection with all phases of masonry problems in the porcelain enameling industry.

Levant Huyck has been responsible for the erection and maintenance of all our refractory structures during the last eighteen years. We have found his workmen skilled, competent and reliable in all their work, whether it be refractory masonry or the lining of mills, agitators or similar equipment with porcelain brick.

We are pleased indeed to recommend Huyck Construction Company without reservation for any masonry problems of the enameling industry.

Very truly yours,
B. T. Sweely
B. T. Sweely, Vice Pres.
In Charge of Research

BTS:W

★ ★ ★ ★ For eighteen years Chicago Vitreous Enamel Product Co. has depended upon HUYCK for both the erection and maintenance of all refractory structures. We are proud of this letter of recommendation as it speaks for the skill and care that goes into every HUYCK job.

★ ★ ★ ★ Our experience includes smelters, furnaces, lining of mills and enamel storage equipment—in fact, every type of masonry for the porcelain enameling plant. Whether it's new work or maintenance, CALL HUYCK for dependable service and long lasting equipment.

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ELMWOOD PARK, ILLINOIS

Eastern enamelers club holds outing

ON Saturday, May 24, the enamelers of the Eastern District got together at Rummie's Tavern, 9 miles from Reading, Pennsylvania, to hold their first real outing since the start of the war.

The outing, held in the form of an old fashioned clam bake and chicken fry, was the Eastern Group's final meeting before the summer recess, and over 125 members and their guests turned out to enjoy the festivities.

Under the chairmanship of Leonard Bilger, of The Prizer-Painter Stove Works, the affair was scheduled to start at noon, but many of the enamelers were on hand several hours before time.

Music, games, singing quartets, group singing and other forms of entertainment were continuous throughout the day. As an added feature, numerous door prizes were awarded.

Climaxing the day's activities, the group gathered on the lawn to enjoy the clam bake and chicken fry.

Pacific Coast enamelers fiesta meeting

By Gilbert C. Close

MAY 23 was the date of a gala double-feature event for members of the Pacific Coast Enamelers Club. That date marked not only the first annual election of officers since organizing, but will be remembered as the first annual Spring Fiesta Meeting, an all day get-together where old clothes, informality, and general good fellowship replaced the more serious demeanor of the usual business meeting.

M. E. Blackburn

R. R. Sherrill

Thirty-eight members met at the Montebello Country Club, east of Los Angeles, and began the day's proceedings with a hearty dinner. Immediately following the meal, the meeting was called to order by retiring president Glen Fulton. After reading the minutes, Fulton made a short speech thanking the members for their cooperation and helpfulness during the initial year of the club's organization, and charged them to continue their support during future club activities. He gave special thanks to the various committees who had shared so generously his executive tasks during the year.

Following submission of names by the nominations committee, election was accomplished by secret ballot. A count of the votes revealed these results: M. E. Blackburn, president; Albert G. Sattler, vice president; R. R. Sherrill, secretary and treasurer; and D. L. Bohon, assistant secretary and treasurer.

The new officers were installed immediately, and M. E. Blackburn, the newly elected president, made a short acceptance speech thanking the members for their confidence and asking for their close cooperation and support during the forthcoming year.

The rest of the day was spent in enjoying the outing. Furious battles raged on the golf driving range.

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Albert G. Sattler

D. L. Bohon

LPGA meets in Chicago

liquefied petroleum gas association increases activity

NEW officers, members of the board, chairmen of sections and districts and committee chairmen of the Liquefied Petroleum Gas Association were announced at the close of the national organization's annual meeting and convention in Chicago during the week of May 26.

About 1,200 industry members from all states of the union and several from foreign countries attended the convention and meetings. Exhibits of new manufactured goods were shown by 80 firms.

The new president is Tallent H. Ransome, president of the Ransome Co., Emeryville, Cal., and widely known throughout the LP-Gas industry. Vice presidents chosen from each district are: Walter Naumer, Carbide & Carbon Chemicals Corp., New York, who was named first vice president; Kenneth H. Koach, Green's Fuel, Inc., Sarasota, Fla., second vice president; D. D. Purrington, Oakland, Cal.; Lon Turner, Denver, Colo.; E. J. Gustafson, Sioux Falls, S. D.; and W. G. Petty, Sr., Memphis, Tenn.

Charles O. Russell, Thermogas Co., Inc., Des Moines, Iowa, who was president until the convention meeting, was chosen as treasurer, and Arthur Kruetzer, of the LPGA National Headquarters staff, was re-elected secretary and assistant treasurer.

Sorby presents publicity and advertising report

E. Carl Sorby, chairman of the publicity and advertising committee of LPGA, in reporting to the board of directors and president on committee activities, expressed the opinion that in the year to come there would be an opportunity to test merchandising weapons. Said the report presented by Mr. Sorby: "Comparatively few in this industry seem to realize its potentials. We *can*, if we but try, become during the next few years a tremendous economic force in this and in other countries . . . . before the war LP-Gas was looked upon merely as something that must be sold in order to sell gas appliances. . . . Dealers and distributors today realize that the day-to-day sale and distribution of just plain gas is a profitable business."

President Ransome speaks.

In its program the publicity committee has been servicing newspapers, magazines, radio and, as early as 1945, started an educational program among school children with a brochure entitled "The ABC of LP-Gas." The committee had a glowing report of results obtained through these media.

Sectional chairmen elected

Elected by men in their own sections of the industry as chairmen of groups were: H. W. Rigterink, Sun Oil Co., Philadelphia, Producers' Section; Lloyd C. Ginn, American Stove Co., Cleveland, Appliance Man-

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Seated, left to right, are the new LPGA officers: Kenneth Koach, Green's Fuel, Inc., Sarasota, Fla., second vice president; Arthur Kruetzer, LPGA national headquarters staff, secretary and assistant treasurer; Tallent H. Ransome, Ransome Co., Emeryville, Calif., president; Walter A. Naumer, Pyrofax division, Carbide & Carbon Chemicals Corp., New York, first vice president; Howard D. White, executive vice president, and Charles O. Russell, Thermogas, Inc., Des Moines, Iowa, treasurer.

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NEWS

Summer homefurnishings market has 475 exhibitors

Chicago will be spotlighted as the nation's housewares center once again as buyers from every state in the Union and many foreign countries converge upon the Merchandise Mart to attend the Summer International Homefurnishings market, July 7 to 19.

With more than 475 housewares, appliance, and allied lines permanently exhibited under one roof, the Mart management anticipates a crowd comparable to that which attended the January show. During the winter all previous market records were broken when approximately 25,000 buyers came for the two-week event.

The enamelware industry, the Mart reports, is still handicapped by the lack of mild steel, and though exceeding 1941 dollar sales volume, the industry is still on strict allocation. The first quarter of 1947 resulted in the largest dollar sales volume for any comparable period in the history of the enamelware group.

Godschall heads new Philco plant

Charles H. Godschall, manager of the Metal Division of Philco Corp. for the past eight years, has been named works manager of the large new Philco refrigerator-freezer production facilities in Philadelphia, it has been announced by E. F. Theis, vice president in charge of refrigerator production.

Godschall joined the company in 1939. He previously had been manager of the Tool Division of the Edward G. Budd Company, and a manufacturing engineer in the automotive division of International Harvester Company.

Tom Smith heads Pressed Metal Institute

At a recent meeting of the trustees of the Pressed Metal Institute, the following officers were unanimously elected: President, Tom J. Smith, Jr., former executive vice president of the Pressed Metal Institute, Cleveland, Ohio; Vice President, Carter C. Higgins, Worcester Pressed Steel Co., Worcester, Mass., and Secretary-Treasurer, M. J. Boehm, Boehm Pressed Steel Co., Cleveland, Ohio.

Cliff Knight leaves McCray

V. C. (Cliff) Knight, vice president in charge of operations of McCray Refrigerator Co., has announced his resignation from that organization. Reports indicate that he is to take over active management of another business which is located in the Chicago area.

Starting with McCray Refrigerator almost 22 years ago, Knight was first employed in the sales department, later spending several years in the field organization where he worked principally in the Southern States. In December, 1940, he was promoted to chief engineer, and became a member of the executive committee. Two years later he was placed in charge of manufacturing facilities as factory manager, and in 1946 was appointed vice president in charge of operations.

Forty five members attend third meeting of Trenton Section of A.C.S.

The third meeting for the year of the Trenton Section, American Ceramic Society, was held at Jack Fowler's restaurant on the Brunswick Pike, Friday evening, May 23, with 45 members present.

L. G. (Tony) Bliss, director of distribution, Foote Mineral Co., Philadelphia, Pa., presented a talk on "The Silver Side of Lithium." His speech dealt with the history and uses — ceramic and otherwise — of this element which has become of importance comparatively recently. The discussion which followed the talk brought out further points of interest concerning lithium.

Chairman O. A. Kanter announced that Clifton H. Cox, industrial consultant, Newark, N. J., would be the speaker for the next meeting to be held in September. Mr. Cox will speak on "The Supervisor's Management Job."

Chicago Section of A.C.S. elects officers

At the final spring meeting of the Chicago Section of the American Ceramic Society, May 23, at the Urbana Lincoln hotel, Urbana, Ill., the following officers for next year were elected:

Ray A. Witchey, A. P. Green Fire Brick Co., Chicago, chairman; J. F. Estes, vice president of Haeger Potteries, Dundee, vice chairman; J. J.

Svec, Industrial Publications, Chicago, secretary-treasurer, and A. I. Andrews, Department of Ceramic Engineering, University of Illinois, Urbana, councilor.

Mr. Witchey outlined plans for next year in preparation for the Fiftieth meeting of the American Ceramic Society to be held in Chicago.

Following the dinner meeting, Dr. Ralph E. Grim, of the Illinois State Geological Survey, spoke on "The Nature and Structure of Clays." Doctor Grim discussed the make-up of the common clays and several of the unusual applications in industry which can be directly attributed to this structure of the clay materials. A discussion followed the talk.

Dr. F. V. Tooley, professor of glass technology, University of Illinois, presented a paper entitled "Fiberglas, Developments and Applications: An Outstanding Example of Property Engineering." Doctor Tooley showed slides of various processes involved in the preparation of fiberglas and the various steps in the making of the fibres. In addition, several examples of the application of fiberglas materials were passed around through the audience.

New gas color-sound motion picture

Herb Richardson, of the American Broadcasting Company in Chicago, enacts the role of first technician in the film.

An elaborate new 16 mm sound-color motion picture, "Winning Seals of Approval," has just been completed by the American Gas Association, and will be released shortly for showing throughout the country. In a dramatic fashion, the film tells the story of the rigid performance tests the modern gas range undergoes before meeting the industry's nationally-recognized standards of approval.

A total of more than 75 scenes and a cast of 16 people were utilized in the picture which is based largely on operations at the A.G.A. testing laboratories. Much of the story is centered around some of the 600 tests a gas range must pass before winning the A. G. A. Seal of Approval. Scenes include operations in a factory laboratory and field inspections on the production line of a large plant.

Foley to railway and industrial supply house

D. E. (Turk) Foley has resigned from Pearson Industrial Steel Treating Company, Cicero, Illinois, and is now associated with the Mississippi Supply Company, Chicago. The latter company deals in railway and industrial supplies.

Foley was formerly with Chicago Vitreous Enamel Product Company, and before that with Armco.

Independent Federation retained as Armco employees bargaining agent

By a majority of more than two to one, the CIO Steelworkers were overwhelmingly defeated by the Armco Employees Independent Federation of the two plants of The American Rolling Mill Company at a National Labor Relations Board election on May 23.

The Armco Employees Independent Federation is an independent union, and has been the recognized bargaining agent. This makes 12 times that the CIO has been rejected by employees of Armco's major plants.

There were 2652 votes cast in favor of the Armco Employees Independent Federation, compared with 1314 for the CIO, while 88 votes indicated a preference of "no union."

Tom Davies forms new company

Announcement was made recently of a new company, T. L. Davies Company, 130th & Halsted Streets, Chicago, to produce "anything in ceramics" — porcelain enamel on copper or steel, glass, pottery, etc. Production will be on small objects suitable for firing in a 9″ x 14″ electric furnace.

Tom Davies, sole owner of the new company, was formerly with Ingersoll Steel Division, Borg-Warner, and before that was with Altorfer Bros. Company.

1948 A.G.A. convention

The 1948 Convention of the American Gas Association will be held in Atlantic City, New Jersey, the week of October 4.

Robert H. Taylor was elected vice president in charge of sales of the Florence Stove Company at a recent meeting of the board of directors. He succeeds Harvey E. Golden who died in January.

Taylor, former general sales manager, has been associated with the Florence sales organization for 15 years, a good portion of this time as manager of the New York sales division. He makes his headquarters at the Florence home office in Gardner, Mass.

Moore enameling announces officers and directors for year

At the annual meeting of stockholders of The Moore Enameling & Manufacturing Company, West Lafayette, Ohio, the following directors were elected for the ensuing year: Walter B. Moore, Warner M. Pomerene, William B. Rodgers, E. F. Stahl and J. P. Wilhelm.

Pomerene, Rodgers and Moore have been directors of the company since it was founded more than 22 years ago. Wilhelm became a director in 1935. Stahl was elected to the board of directors for the first time at this last meeting.

At the quarterly meeting of the board of directors, the following officers were elected: Moore, president, general manager and chairman of the board; Stahl, executive vice president and general sales manager; Wilhelm, vice president and treasurer; Rodgers, vice president; H. E. Morgan, assistant treasurer and controller; E. B. Huff, assistant secretary, and Pomerene, legal counsel.

In the president's report there were pointed out these following factors of interest and concern in connection with the business, as related to increased costs of production: "Using 1941 as base period when prices were frozen, steel had advanced 20%; chemicals up 30%; cartons up 68%; and labor up 83%. A total increase in production costs of 56%. Whereas the company had been able to raise prices for its products only 17%, the greater amount of this 17% going into effect since January, 1947." The president also pointed out that free benefits for employees, and paid by the company, amount to more than $200,000 a year.

A. C. S. officers and board of trustees

Officers and Board of Trustees of the American Ceramic Society, snapped during their meeting in the club room of the Hotel Traymore during the A.C.S. convention are, seated, left to right, E. H. Fritz, J. E. Hansen, retiring president, John D. Sullivan, newly elected president, John W. Whittemore, new vice president, W. E. Cramer, treasurer, and Charles S. Pearce general secretary. Second row, left to right, are A. K. Lyle, R. M. Campbell, L. C. Hewitt, F. R. Porter, J. H. Isenhour, E. M. Rupp, and M. F. Beecher. Third row, left to right, are J. R. Beam, C. M. Dodd, Theodore Lenchner, J. S. Gregorius, and J. W. Hepplewhite.

Ironrite expands

W. R. Dabney has been elected director of the Ironrite Ironer Co., Mt. Clemens, Mich., manufacturer of household ironers, to succeed the late Robert Potter, New York City.

Dabney is vice president and general sales manager of the company, and has served it in various capacities for 21 years.

The company's expansion program is said to have provided three times the former production facilities.

Forty-six-year period figures revealed by Youngstown Sheet and Tube Co.

During the 46-year period from 1900 through December 31, 1946, The Youngstown Sheet and Tube Company shipped 52,282,178 net tons of steel products, and paid its employees $1,173,351,057 in wages and salaries, according to William H. Texter, assistant sales promotion manager. These facts were released by Texter in a speech delivered before the supervisory management forum of The Economic and Business Foundation held in Youngstown, Ohio.

The company paid approximately $200,000,000 in taxes, of which nearly $73,000,000 was in city, county and state levies, and contributed $3,084,000 to various charitable and community welfare organizations, Texter stated.

In his speech, Texter also pointed out that the company employs approximately 25,000 persons, has total assets of $230,000,000, has 11,779 shareholders, has an average investment of $8,000 per employee, and last year produced 3,242,135 tons of steel ingots.

1948 Natural Gas meeting

The Natural Gas Department of the American Gas Association has selected Houston, Texas, for the place of its annual spring meeting to be held there on May 4 and 5. Headquarters will be at the Rice hotel in Houston.

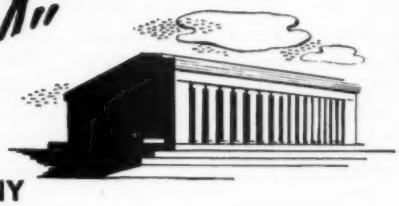
Edward L. Stine dies — over half a century in enameling

Ferro Enamel Corporation's oldest employee, in point of years and almost in number of years of service, died at Cleveland, Ohio, on May 19. He was Edward Lewis Stine, age 86. He had been with Ferro Enamel Corporation since 1922.

Mr. Stine's career in porcelain enameling started in 1887, when porcelain enameling was by "rule and thumb." He was sent to Germany to learn the art of porcelain enameling and to bring back formulae. Fifty

"develop an all-purpose Porcelain Enamel"

. . . the O. HOMMEL COMPANY



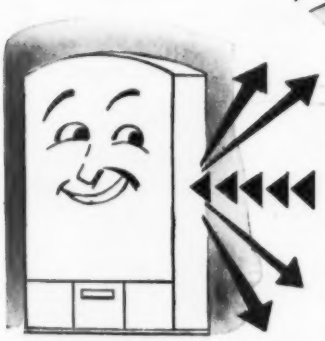
TITE-WITE CAN BE APPLIED EXTRA THIN

Tite-Wite can be applied practically as thin as the best organic finishes! 15-20 gram application weights in a porcelain enamel can be had with Tite-Wite.

Records for application weights, reflectance, acid resistance, bonding strength, chipping, weather and scratch resistance, gloss appeal, greater production and lower costs have been established.

Tite-Wite is easily the greatest current development in porcelain enamel finishes. Compare its advantages, and the savings available to you are apparent by using Tite-Wite . . Production men appreciate the better workability of Tite-Wite

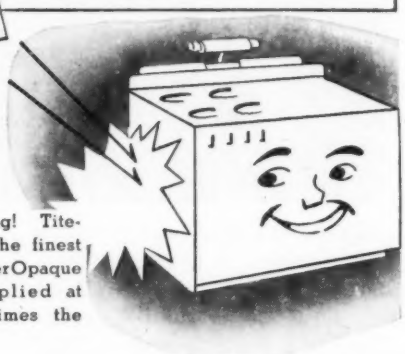
If you are having production trouble with steel, write, phone or wire for a Hommel Service Engineer. Hommel Ground Coat is working successfully with steel that formerly was considered unsatisfactory for enameling purposes.



REFLECTANCE READINGS OF 75 TO 80.

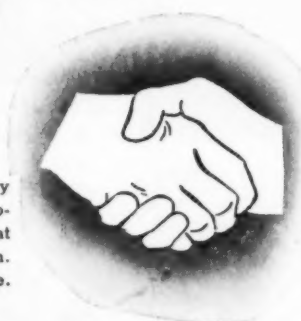
Reflectance readings of 75 to 80 per cent plus. A real white enamel that can be drained, dipped or sprayed and reduces black edging problem.

Write today for detailed folder showing the many applications of Tite-Wite, the frit of many uses.



BONDING STRENGTH AND OPACITY NEVER BEFORE EQUALED!

Bonding strength and opacity never before equaled! Exceptional bonding strength that defies thermal shock and strain. Tite-Wite is absolutely opaque.



MINIMIZES CHIPPING!

Minimizes chipping! Tite-Wite is equal to the finest antimony free Super Opaque Cover Coats applied at twice to three times the thickness.

Laboratory Controlled Production of Ceramic Supplies

THE HOMMEL C
TTSBURGH 30, PA
Pacific Coast Agents
L. H. BUTCHER CO.

- FRIT for Steel, Cast Iron or Pottery
- CERAMIC COLORS
- CHEMICALS
- BRONZE POWDERS
- METAL POWDERS
- SUPPLIES
- EQUIPMENT

Our Technical Staff and Samples are available to you without obligation. Let us help you with your problems.

World's Most Complete Ceramic Supplier

thousand dollars was said to have been paid for his training and the formulae.

Returning to the United States, the young enameler went to work for American Stamping Company, Portland, Connecticut. He built their ten porcelain enameling furnaces, installed pickling and dipping equipment and started the plant in operation. He operated the plant for 11 years and then it was purchased by the National Enameling & Stamping Company. In subsequent years, Mr. Stine served as porcelain enameler for the following firms: Sidney Shepard Company (now Republic Metalware) of Buffalo, New York; Federal Stamping & Enameling Company, McKees Rock, Pennsylvania; Lisk Manufacturing Company, Canandaigua, New York, and the McClary Manufacturing Company in Canada — then to Ferro in 1922.

Frigidaire announces plant organization changes

Carl N. Bogan

J. W. Krueger

The appointment of new superintendents for two Frigidaire plants has been announced by M. M. Roberts, works manager of this division of General Motors.

Carl N. Bogan, formerly superintendent of Frigidaire's service parts production Plant 3, is now general superintendent of Plant 2, Moraine City, the mile long plant in which is included the company's porcelain enameling division.

Louis G. Hahn, assistant superintendent of Plant 2, has been named general superintendent of Plant 3.

The changes have been made, Roberts said, because of the resignation of John W. Krueger, who has been Plant 2 superintendent since 1940. Kruger is leaving to accept a position as vice president and general manager of the Seeger Refrigerator Company's Evansville plant, according to the Frigidaire report.

Bogan joined the General Motors organization when he became associated with Delco Light Company in 1917. Following World War I service and association with two other Dayton companies, he returned to Delco Light in 1925 and soon after joined the Frigidaire organization.

School replacement program for Universal gas ranges

Cribben and Sexton Company has announced to dealers and utilities a plan to provide installation and replacement of Universal Gas Ranges in home economics departments of educational institutions.

Under this program, schools can purchase Universal gas ranges from their dealer or utility at approximately 50 per cent of the retail list price. This includes installation and servicing. The ranges will then be replaced periodically at no charge to the school. The replacement period is determined between the school and dealer or utility. Minimum period is one year, maximum three years. The agreement runs for six years, and can continue longer if agreed by school and dealer or utility.

May form Michigan District Enamelers Club

A letter signed by S. E. Hemsteger, chairman of the Organizing Committee, Michigan District Enamelers' Club, and dated June 2, was mailed to the available list of enamelers in the Michigan territory. The letter referred to discussions concerning the formation of a Michigan District Enamelers' Club which have been carried on over a period of months. It briefly outlined the purposes of the local clubs and explained how they served a large group of men, many of whom would not normally attend meetings of the American Ceramic Society or the Porcelain Enamel Institute. The expressed intent of the letter, which included a survey postal card, was to determine the extent of the interest among Michigan enamelers and the support which might be expected should such a group be formed.

Finish urges that any Michigan enamelers who may not have received the original letter referred to express their opinions by referring to this article, and mailing their comments to S. E. Hemsteger, chairman, Organizing Committee, Michigan District Enamelers, Box 465, Franklin, Michigan.

In the event the response from enamelers is adequate, an organization meeting would be planned for some time in the early fall.

A.G.A. executive group appointed

An executive committee of seven members, with full power to act for the executive board of the American Gas Association between regular meetings, was appointed at a recent board meeting held in Milwaukee, Wisconsin. This action follows adoption of a recent amendment to the A.G.A. constitution and by-laws by the Association's membership.

The executive group, which is ex-

pected to expedite the conduct of Association affairs, consists of the president, R. H. Hargrove, vice president, United Gas Pipe Line Co., Shreveport; the vice presidents, Hudson W. Reed, president, The Philadelphia Gas Works Co., Philadelphia, and Robert W. Hendee, president, Colorado Interstate Gas Co., Colorado Springs; the immediate past president, Everett J. Boothby, vice president and general manager, Washington Gas Light Co., Washington, D. C.; Lyle C. Harvey, president, Bryant Heater Co., Cleveland, representing the manufacturers; George F. Mitchell, president, The Peoples Gas Light and Coke Co., Chicago, and E. H. Eacker, vice president, Boston Consolidated Gas Company.

Merit award competition to be featured at Second International Lighting Exposition

E. C. Huerkamp, chairman, right, and R. W. Staud, vice chairman, 2nd International Lighting Exposition operating committee, preview enlargement of Exposition's Gold Seal Merit Award Certificate.

As a feature of the second International Lighting Exposition and Conference, to be held November 3-7 at the Stevens Hotel, Chicago, a lighting merit award competition is being sponsored by the Exposition. The competition is for outstanding examples of planned lighting in industry, offices, stores and schools; street lighting, airport lighting and floodlighting.

While the merit awards and twelve Gold Seal $100 awards are open only to electrical contractors, electrical wholesalers, architects, utility lighting and power men and consulting engineers, the merit award committee is urging all industrial, commercial and school executives to encourage the submission of their installations in this competition.

All entries accepted by the judges will be displayed in a special section of the Exposition hall.

A rules book containing twelve pages of rules and suggestions for preparing entries, plus an official entry blank, is now available from any of the more than 80 lighting manufacturers exhibiting at the Exposition, or by writing the Merit Award Committee, 326 W. Madison St., Chicago 6, Ill. All entries must bear a registration number, to be supplied by the committee, and must be postmarked not later than midnight, August 31, 1947.

Store modernization competition

A competition for students of architectural colleges to prepare a plan for modernization of a shopping center has been announced jointly by the New York chapter of the American Institute of Architects and the Store Modernization Show. Plans submitted will be exhibited at the show at the Grand Central Palace, New York, July 7-12, inclusive, and judged there by a committee of the New York chapter of the A.I.A.

Fifteen colleges already have accepted invitations to participate. The plan for the shopping center must be designed for a city of 50,000 inhabitants and contain ten or twelve stores. Details of the competition, as well as registration cards for the show, may be obtained from Store Modernization Show, 20 East 55th St., New York 22, N. Y.

U. of I. news

James A. Crookston has been appointed to the A. P. Green Fellowship in the Department of Ceramic Engineering at the University of Illinois. This fellowship is to be devoted to the fundamental study of refractory problems. Crookston received his B.S. degree in Ceramic Engineering at The Missouri School of Mines in May, 1942. After graduation, he worked on laboratory control work and on development work with A. C. Spark Plug at Flint, Michigan. In September of 1946 he returned to the Missouri School of Mines and received the Master of Science degree in June of 1947.

Bob Calton to Chicago Vit

Robert G. (Bob) Calton, who has been executive vice president of Tennessee Enamel Manufacturing Company for the past 18 years, joins the sales staff of Chicago Vit., July 1, to work with enameling plants in

the southern territory, according to a company announcement.

Bob was production manager for Seeger Refrigerator Company, St. Paul, Minnesota, for 3 years. He has been president of the Porcelain Enamel Institute for 2 terms. During the war, he headed a committee for defense, and for the past 2 years has been president of the Cincinnati Post of the Army Ordnance Association.

Wesley L. Dinsmore, formerly superintendent of the porcelain enamel department, General Electric Co., Lynn, Massachusetts, joined the Chicago Viterous Enamel Product Co. organization on May 14 in the capacity of service engineer.

Over 1,000,000 oil burning space heaters for 1947

Manufacturers of oil burning space heaters, who have been on a stepped-up production basis since the close of the war, expect to top last year's output of 1,000,000 units during 1947.

At the present time, there are approximately 3,500,000 oil space heaters in use throughout the nation, according to estimates supplied by members of the Oil Division, Institute of Cooking and Heating Appliance Manufacturers. In addition, there are in use approximately 1,000,000 water heaters, floor furnaces, trailer heaters, and central heating plants equipped with the vaporizing pot type of oil burner.

Roberts & Mander Corporation, Hatboro, Pa., makers of "Quality" ranges and steel kitchen cabinets, has announced the appointment of Marvin F. Boss as sales representative for the entire state of California.

Eagle named manager of Pemco color divisions

Jake E. Eagle has been appointed manager of the color divisions at the Pemco Corporation, Baltimore, according to an announcement by W. R. Greer, vice president of the company.

Eagle joined Pemco the earlier part of 1946 to organize and manage the company's new glass color division. In his new capacity he will manage both the enamel color division and the glass color division. Prior to his association with Pemco, Eagle was Chief of the Non-Metal Section of the War Production Board in Washington, D. C. He was associated with the tile industry for 8 years

to Page 54 →

Rotospraying ... is the STANDARD

One of the Rotosprays in daily use at Briggs Manufacturing Co., Plumbing Ware Division, Detroit, Mich., where a steady stream of Briggs Beautyware, requiring extremely high inspection standards, is turned out in great volume.

Yes . . . Rotospraying IS the standard method for sieving porcelain enamel slip. It took years to earn this position — years of satisfactory operation of hundreds of Rotosprays in the country's leading porcelain enameling plants.

Rotospray has been behind in production for months because of the great increase in enamel plant production facilities, coupled with the fact that practical enamelers everywhere now depend on Rotospraying for handling all sieving problems.

Plant men also have found that by using multiple units to service individual operating points, the time and labor saved by the use of these convenient installations more than pays for the initial cost.

ROTOSPRAY
Reg. U. S. Pat. Off.

Sales representatives —
B. F. DRAKENFELD & CO., INC., N. Y., N. Y.
PEMCO CORPORATION, Baltimore, Md.
D. HOMMEL CO., Pittsburgh, Pa.
FERRO ENAMEL CORP., Cleveland, Ohio and foreign offices
CHICAGO VITREOUS ENAMEL PRODUCT CO., Cicero, Ill.
BRAUN CORPORATION, Los Angeles, Cal.
BRAUN KNECHT & HEIMANN CO., San Francisco, Cal.

Foreign representatives —
WATFORD ENGINEERING WORKS, Watford, England
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ROTOSPRAY MANUFACTURING COMPANY
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LPGA meets in Chicago

(Continued from Page 35)

ufacturers' Section; J. Richard Verkamp, Verkamp Corp., Cincinnati, Marketers' Section; and Kenneth R. D. Wolfe, Fisher Governor Co., Marshalltown, Ia., Equipment Manufacturers' Section. The sectional chairmen will also serve on the board of directors. In addition, members were elected by industry men in their own states to serve on the national board of directors.

The group selected Kansas City, Mo., as the next convention site. The next annual meeting, exhibition and convention will probably be held in June, 1948.

ICHAM mid-year convention

(Continued from Page 27)

activity of the individual divisions, each of which had a complete program for covering the subjects of greatest importance for the individual groups.

A. K. Walton, vice president of Newark Stove, presided at the Electric Range Division meeting, with Harry J. Holbrook, manager of electric range sales, Norge; S. K. Harrington, purchasing agent, A-B Stoves; and M. J. Maier, vice president, Malleable Iron Range, as discussion leaders.

A. B. Ritzenthaler, vice president of Tappan, presided for the Gas Range Division; J. E. Wyatt, Jr., executive vice president of Dearborn Stove, for the Gas Space Heater and Floor Furnace Division; A. T. Atwill, president, Quaker Manufacturing, for the Oil Division; and Leonard Raulston, general manager, U. S. Stove, for the Solid Fuels Division.

B. J. Adams, credit manager, Motor Wheel, led the meeting of credit managers; A. F. Jacques, controller, Lindemann & Hoverson, the financial executives and accountants; F. H. Guthrie, president, Newark Stove, led the labor relations officials; and F. A. Kaiser, assistant to the president, Detroit-Michigan Stove, the sales and advertising executives.

Presiding over the meeting of the Oil Division technical committee was A. D. Olds, chief design engineer, Coleman, while E. Esson, development engineer, Locke Stove, led the meeting of Solid Fuels Division technical committee, and Arch. Black, vice president of Borg-Warner International, the export committee.

A porcelain enameled baking pan is very useful for heating rolls and warming or freshening dry bread and cake.

The home equipment industry is now represented on the board of directors of the Association of National Advertisers, with the election of Marshall Adams, of Mullins Manufacturing Corporation, Warren, Ohio, to the board. He was named at ANA's annual fall meeting in Atlantic City early in October.

Three Elephant

BORAX and BORIC ACID

Products of American Potash and Chemical Corp.

IMMEDIATE DELIVERY

for full information and prices, write, wire or phone... **CHerry 0296**

FERRO CHEMICAL CORPORATION

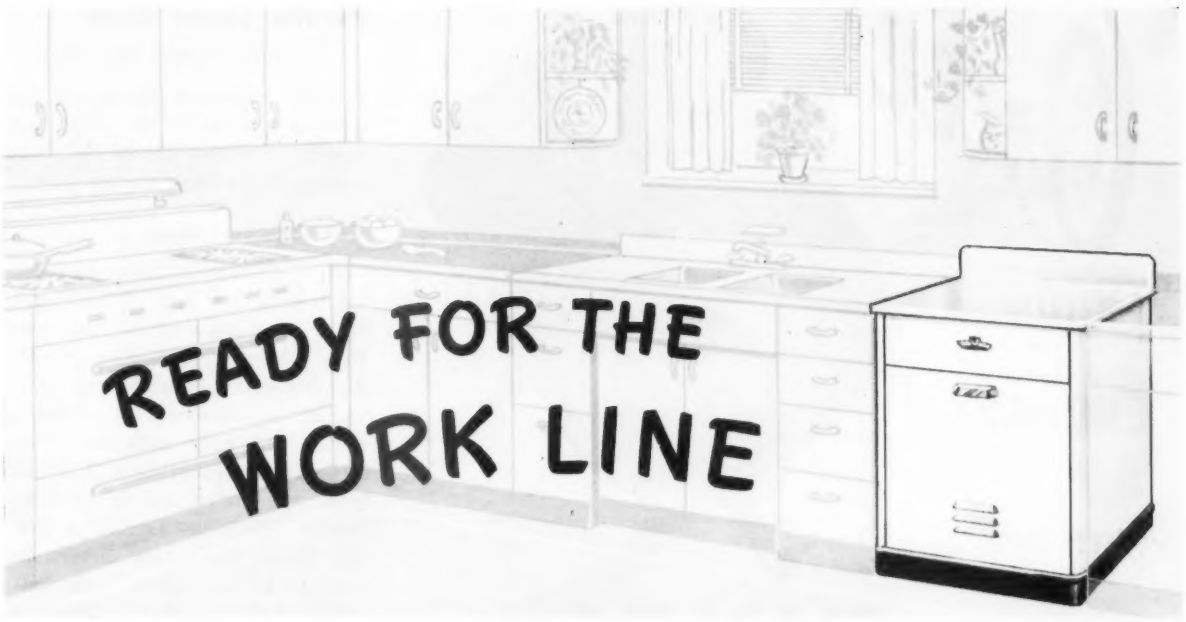
Successor to W. B. Lawson, Inc., and Ferro Drier & Chemical Co.
(Subsidiary of Ferro Enamel Corporation)

Union Commerce Building — Cleveland 14, Ohio

Remember the name FERRO CHEMICAL CORPORATION

MANUFACTURERS: Driers for Paint and Varnish, Printing Ink, and Allied Industries.

DISTRIBUTORS FOR: Aluminum Ore Co.; American Potash & Chemical Co.; Darling & Co.; Duquesne Smelting Corp.; Lindsay Light & Chemical Co.; Philadelphia Quartz Co.; Stauffer Chemical Co.; Tennessee Corp.; Virginia Carolina Chemical Corp.; Wyandotte Chemicals Corp.; and others.



The Cleveland Heater Company makes this compact, efficient REX electric, automatic, storage water heater. It is designed to take its place in the kitchen where hottest water is needed.

Set up next to the range, or sink, or kitchen cabinets, this heater's VITREO top provides an extra working surface that is stainless, easily cleaned and permanent. There is a porcelain enameled back apron too for wall protection.

Whenever a device is designed for kitchen installation, a VITREO top doubles its usefulness.

VITREOUS STEEL PRODUCTS CO.

BOX 1791, CLEVELAND 5, OHIO *(Factory at Nappanee, Ind.)*

Once

THROUGH IS ENOUGH!

WITH THE

DINGS

DE-IRONER

Slip — whether recovered or new — needs only one pass through the Dings De-Ironer for thorough cleaning by removal of iron particles. This "one-pass" separator has no secret mechanism . . . It is more powerful and does a better job simply as a result of an accurately balanced magnetic circuit having longer coil windings for greater magnetic intensity; and many more lineal feet of stainless steel grid area to catch and hold iron present in the slip. *Dings De-Ironers, size for size, have 20% to 30% greater capacity than any other separators of similar type.*

Write today for full information on the right Dings De-Ironer for low cost, "one-pass" magnetic separation in your plant.

DINGS MAGNETIC SEPARATOR CO.
4750 W. McGeogh Avenue
Milwaukee 14, Wisconsin

De-Ironer Features:

- 20% to 30% greater capacity, size for size, than any other magnetic separator of this type.
- Stainless steel grids—spot welded and heavily chrome plated.
- Open or pressure models available—can be operated top-to-bottom or bottom-to-top.
- Solenoid safety valve, with only one moving part, prevents slip contamination in case of current failure.
- Float valve insures complete coverage of grids while De-Ironer is working.

Coils wound for continuous "High Intensity" operation.

Dings
"HIGH INTENSITY"

"Separation Headquarters Since 1899"

Pacific Coast Club

(Continued from Page 34)

Friendly arguments discussions and refreshments made the time pass quickly. Everyone agreed the Fiesta meeting was a huge success.

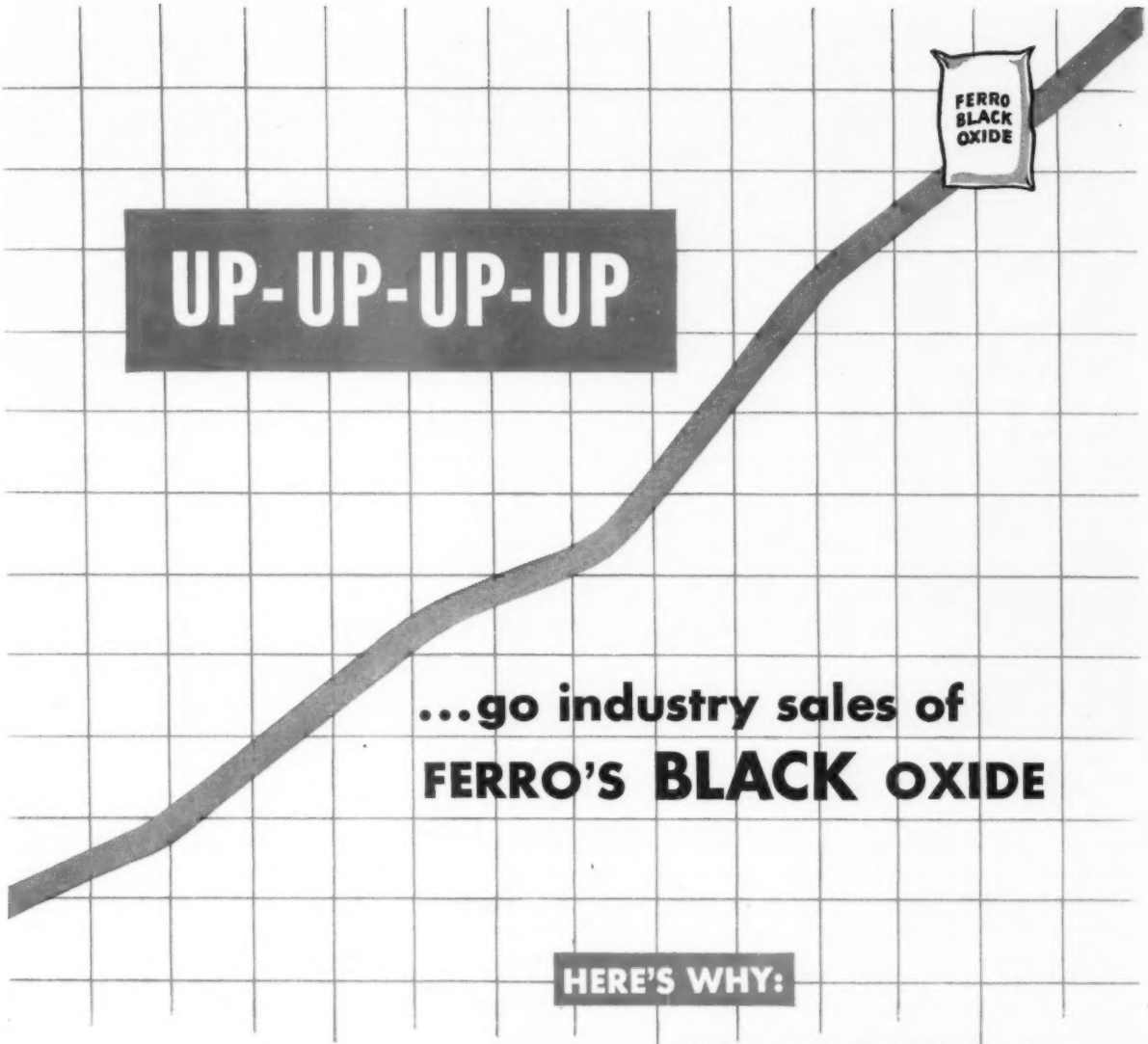
Notes on new officers

M. E. Blackburn, better known to his friends as "Bud" Blackburn is plant superintendent of California Metal Enameling Co., Los Angeles. Bud is known throughout the industry as an old-timer in enameling work. He started as a boy, when he worked for his father, M. L. Blackburn, who owned and operated the Novelty Stamping Company, Bellaire, Ohio. During his career, and prior to his association with California Metal Enameling Co., Bud was plant superintendent for Republic Metalware Co., Buffalo, New York, and worked in the enameling department at Mullins Mfg. Co., Salem, Ohio. Blackburn has been on the Pacific Coast for the past ten years.

Al Sattler has been connected in some capacity with the enameling industry in the Los Angeles area for the past 23 years. In 1924 he became associated with Smoot-Holman Co., Inglewood, California, and stayed with this company for four years. In 1928, as a co-owner, Al helped organize the U. S. Porcelain Enamel Co. He has been with the organization ever since.

R. R. Sherrill has been an engineer with Ferro Enamel Corp. since 1935. Bob's constant circulation among the various Pacific Coast Enamelers makes him one of the best known and best liked fellows in this area. He is always ready with sound advice and a helpful hand.

D. L. Bohon has been connected in some capacity with industrial equipment on the West Coast since 1930. In 1939, he joined the DeVilbiss Co., manufacturers of spray equipment, as an industrial representative. His long association with this type of work makes him a handy man to have around when spraying problems become bothersome.



UP-UP-UP-UP

...go industry sales of FERRO'S BLACK OXIDE

HERE'S WHY:

- **Strong, concentrated black**
- **High Tinting Strength**
- **Rich, Clean Color**
- **Exceptionally Trouble-free from Blistering and Ground-Coat Defects**
- **Easy to Work**
- **Meets High Physical Tests**
- **Production Proved**
- **Economical**

COMING SOON!

a new improved RED OXIDE

A new *brilliant* and unusually-stable RED OXIDE—with the outstanding qualities found in all Ferro color oxides—will be available soon. Watch for it! You'll want it!

If you haven't already tried Ferro's new, concentrated F-1335 Black Oxide, order a trial quantity today!

FERRO ENAMEL CORP.

4150 East 56th Street • Cleveland 5, Ohio

→ *from Page 25*

to torsion; however, the impact resistance, abrasion resistance and scratch resistance of the antimony and zirconium enamels are apparently within the limits of statistical error of the test method.

Antimony-opacified enamels are superior to the zirconium in the matter of acid resistance. In the matter of impact resistance the antimony and zirconium enamels are slightly superior to the titanium enamels, and again there appears to be no statistical difference between the antimony and zirconium enamels in this respect.

In regard to coefficient of thermal expansion, the antimony and zirconium-opacified enamels have a higher expansion than the titanium, with the antimony being slightly higher than the zirconium, and the zirconium slightly higher than the titanium.

The fusion viscosity characteristics of the antimony and zirconium enamels are largely dependent upon the composition of the enamel; however, all of the titanium enamels appear to be considerably more viscous between 1400 and 1500° F. than are the antimony and zirconium enamels.

The use of liquefied petroleum gas in ceramic industries

By G. R. Benz and E. A. Jamison

Liquefied petroleum gas, namely, butane, propane and mixtures of the two, are relative newcomers in the industrial heating field as compared to solid fuels, oil, natural gas and electricity. In twenty years the industrial use has grown tremendously, until in 1946 it was estimated to have been 257,000,000 gallons and the total for the industry, 1,425,000,000 gallons.

Liquefied petroleum gas or LP gas in short are, as the name implies, gaseous in their normal state but liquefiable at normal temperatures by moderate pressure; thus, permitting economical transportation, storage and handling. Both LP gas and natural gas belong to the paraffin series of hydrocarbons.

The LP gases are available from two sources of supply; natural gasoline plants and oil refineries, where they are extracted from the gases resulting from distillation and crude oil cracking.

They are shipped, stored, and handled as liquids under pressure in tank cars or tank trucks and storage tanks of suitable working pressure, 200 psi WP being required for propane.

For utilization the liquid is forced by its own vapor pressure from the storage tank to a vaporizing or expanding unit, at the outlet of which are located pressure regulators which supply plant gas lines at the pressure desired.

LP gases are non-toxic but slightly anesthetic when concentrated amounts are inhaled over a considerable length of time. They are odorless in their natural state, but for safety reasons odorized prior to shipment. They are heavier than air and therefore proper precautions for floor level ventilation must be provided.

Storage tanks of 18,000 or 30,000 gallons gross capacity are normally used. The 30,000 gallon tank is the largest approved by the National Fire Protection Association. A complete installation will cost approximately from 30¢ to 50¢ per gallon of installed gross storage capacity and normally two weeks or more reserve is considered desirable where LP gas is being used for continuous operation.

Two qualities which make LP gas particularly adaptable to the firing of ceramic kilns is their high available heat and their slow and uniform rate of flame propagation.

The fact that butane and propane contain practically no sulphur or other impurities which cause scum or discoloration is another point of interest in connection with these fuels. The fact that they are of uniform composition also makes them desirable.

LP gas can be used interchangeably with manufactured or natural gas in the total premix, partial premix or low pressure combustion systems by proper adjustments to the equipment. Where used interchangeably with manufactured or natural gas, the thermal value of the replacing LP-gas-air mixture is determined by the thermal value and gravity of the alternate gases, so as to provide the same thermal input through any given orifice.

Burners which were formerly used with manufactured gas sometimes, however, require changes when substituting LP gas because of the difference in rate of flame propagation; however, the same burner can be used as with natural gas.

The firing operation is one of the most important processes in the manufacture of ceramic products. This is because, first, the physical properties and appearance of the ceramic ware are finally determined by the proper firing process, and, second, the cost of firing usually amounts to approximately 25 per cent of the production cost.

Liquefied petroleum gases have been used since 1932 by one of the largest producers of high quality sanitary ware in this country. The vitreous enameling furnaces when using either producer gas or oil were of the muffle type. Because of the almost total absence of any form of sulphur, lack of inerts, and uniformity of LP gas, it was possible to convert all of these furnaces to the semi-muffle type with a resulting evenness of temperature, more flexible control and a reduction in the number of rejects.

After numerous tests of long duration, it was found that the maintenance cost of the burner equipment with oil was greater than with LP gas, this being the result of elimination of labor for cleaning burners, keeping the pumps, steam traps and regulators in repair and other such work as is required in the operation of oil equipment. It has been their experience that practically no maintenance has been required on the LP gas burners and this includes experience over a number of years.

to Page 56 →

Newest of two Boland continuous furnaces in the plant of Tennessee Enamel Manufacturing Company, Nashville, Tennessee

Another BOLAND Continuous Furnace is producing quality ware — —

From North, South, East and West comes the same story — Boland continuous furnaces are producing more ware, and better ware. The reasons are built-in reasons, a part of the furnace design and construction.

First of all, Boland straight away, SINGLE FLOW design insures equalized temperature, from two muffle walls, for both sides of the ware. A gradually increasing temperature in the pre-heat zone aids in the kind of uniform firing that every enameler wants.

Next to consider is the FULL FURNACE LOAD, the bigger pay load, made possible by straight away construction. There need be no waste space in a Boland furnace to provide for proper spacing at narrow radius turns.

And, here is a point you can't afford to ignore — Boland, and only Boland, offers the exclusive, patented FLOATING ROOF CONSTRUCTION, "built like Gibraltar." This feature, together with strong construction throughout, is a big reason why Boland furnaces continue to produce quality ware in quantity long after an ordinary furnace may be requiring costly repairs. Let's talk over your furnace problems.

ALBERT J. BOLAND COMPANY

407 NORTH EIGHTH BUILDING • ST. LOUIS 1, MO.

Designers and Builders of Continuous and Box Type Enameling Furnaces

New Supplies and Equipment

Device gives machining speeds and feeds

A new circular, "Cutting Speed and Feed Selector," quickly gives proper speeds and feeds for all common machining operations on 8 types of Republic Steel. Form cutting, milling, drilling and other operations usually performed on an automatic are included.

The selector device also converts surface cutting speeds to spindle speeds for stock from 0.1" to 8" diameter. The selector may be obtained free from Republic Steel Corporation, Cleveland 1, Ohio. Just say "I saw it in *finish*."

Electro-analysis apparatus

The re-designing of their electro-analysis apparatus, for determinations of nickel, copper, lead, antimony, cadmium, zinc, chromium, etc., has been announced by Eberbach & Son Company, Ann Arbor, Michigan.

A built-in selenium dry type full wave rectifier delivers 8 volts 5 amperes DC at both spindles for simultaneous determinations or 10 amperes DC for a single determination. The apparatus operates from line current without auxiliary electrical equipment.

All electrodes including rotating type may be used. When using rotating anode set-up, no changes in electrical circuit are required as a brush contact furnishes power to electrode holder.

A 32-560 Eberbach electro-analysis apparatus may be used on either 110 or 220 volts, 60 cycle, single phase, AC power requirement 400 watts maximum.

Self-powered arc welder

Designed for shop, yard and field service, a new self-powered arc welder is now offered by Harnischfeger Corp., Milwaukee, Wisconsin.

The P&H Model WN-200 welder is an N.E.M.A. rated machine of 200 amperes, but has a welding service range of from 30 to 260 amperes. Available as a stationary or trailer unit, it has the engine and welder securely mounted on an all-welded frame of sturdy steel tubing and heavy angle iron. The skid is ideal for transportation on trucks. A large lifting crane eye is also provided.

High temperature research aided by ice calorimeter

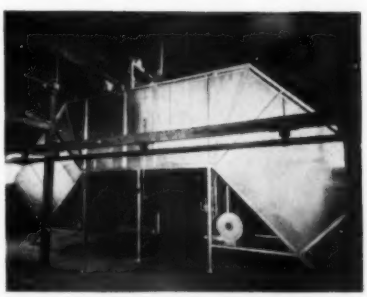
A modified Bunsen ice calorimeter, comparable in precision of results with the best electric calorimeters, has been developed in the Heat Measurements Laboratory, National Bureau of Standards, Washington, D.C.

While modern use of the ice calorimeter has been largely in the sensitive measurement of small amounts of heat, the present development makes possible the extension of the method to accurate measurement of large quantities of heat energy. This feature has particular application to the measurement of heats of reaction and heats of solution in those cases where the low operating temperature of 0° C. does not impose a limitation.

The Bureau has already furnished high-temperature specific-heat data upon several substances requested by industry. Information on the thermal properties at high temperatures of certain materials, particularly ceramics and metals, is needed in such fields as metallurgy and engineering-equipment design.

From the experimental specific heat data extending from the absolute zero to high temperatures, it is possible to compute the thermodynamic quantities, free energy and entropy, of various compounds at high temperatures. This information is useful in determining the extent a given chemical reaction may be expected to take place under specified conditions of temperature and pressure.

Burn-off process for metal cleaning



An oven, heated with infra-red gas-fired burners, has been introduced to replace liquid degreasing equipment and other types of washing and cleaning methods for steel.

Example is given of the replacement of a complete cleaning cycle consisting of alkali wash, two rinse tanks, a solution for the promotion of bond, and an acid tank with the infra-red process.

For detailed information contact Burdett Manufacturing Co., 3401 West Madison St., Chicago 24, Ill.

U. S. Steel designs new microhardness tester

The hardness of microscopic grains within a piece of steel can be measured by a new device designed at the Research Laboratory of the United States Steel Corp. of Delaware. This new microhardness tester can gauge the hardness of a single steel grain at as many as three points within the breadth of a human hair.

Like the Brinell, Rockwell, Vickers and other traditional hardness testers, this new device operates by indenting the polished surface of a steel sample, but on a much finer scale. Its diamond-point penetrator,

under a load of a very few grams, leaves a square mark which can rarely be seen by the naked eye. The diagonals of this tiny square indentation are measured in microns, or thousandths of a millimeter. This reading is related to the load placed on the penetrator so that hardness may be computed.

Rubber processed separators

Woven wire screen and expanded or perforated metal in all mesh and sizes, completely covered with rubber, is available for materials handling purposes at the Automotive Rubber Co., Inc., 8625 Epworth Blvd., Detroit 4, Michigan.

Purpose of the screens is to protect finished parts from becoming disfigured by contact with metal surfaces. The mesh separators likewise permit drainage.

Industrial literature

Blue book of stamping manufacturers

The third edition of "The Blue Book of Stamping Manufacturers" has just been issued.

This directory is divided into three sections: (1) alphabetical list of Pressed Metal Institute members, both active and associate, (2) geographical breakdown of membership, and (3) facilities of active members. It is available to all interested designers and purchasers of stampings.

Write the Pressed Metal Institute, Room 829, Union Commerce Bldg., Cleveland, Ohio.

Air brushes and spray guns

A recently published catalog, showing illustrations of many types of air guns available and explaining their various specialized uses in the ceramic industry and general application in other industries, may be had by writing the O. Hommel Company, 209 Fourth Avenue, Pittsburgh, Pa.

Bulletin No. 6001

This bulletin contains performance tables, dimensions and other data on direct-driven and belt-driven tube-axial fans. Illustrated are exhaust fans of various types, spray booth fans, high temperature alloy fans, mechanical roof ventilators, dust collectors, etc.

Contact Robinson Ventilating Company, Zelienople, Pa.

Leaflets on sampling techniques and metallurgical applications

The following leaflets are available gratis on request: "Sampling Techniques Applied to Quality Control," by Eugene Goddess, factory engineer, with three charts and three tables plus text material (8 pages), and "Metallurgical Applications of the X-ray Diffraction Spectrometer," by John L. Abbott, application engineer, with 15 photos, 23 charts and three tables plus text material (16 pages).

Contact the North American Philips Co., Inc., 100 East 42nd Street, New York 17, N. Y.

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Lithium compounds in porcelain enamel compositions

(Continued from Page 22)

presence of lithium manganite. The equivalent amounts necessary to equalize the amounts of refractory elements will have to be determined.

It can be said that one per cent or more of lithium manganite will lower the firing temperature up to about 50° F., without otherwise softening the enamels to a point at which troubles like reboiling, blistering, hairlining, and the like arise. Nor will the introduction of lithium manganite and/or lithium cobaltite create copperheads, shiners, or fishscale. It seems, on the contrary, that lithium manganite and/or lithium cobaltite have a strong influence on eliminating such imperfections. In many cases, a simple replacement of manganese dioxide with lithium manganite, or reducing the equivalent percentage, will give desirable results.

Some of the lithium manganite ground coats work even without the regular additions of cobalt and nickel oxides, though the resulting product is, of course, lighter in color. This is especially the case on the lower gauges of steel. Very often, however, a small addition of lithium cobaltite or of nickel oxide, or of both, appears advisable. About .1% of lithium cobaltite and/or nickel oxide exhibit a marked influence.

Very good results have been obtained by replacing cobalt oxide with one-half of its weight of lithium cobaltite. Thus, all good adherence characteristics of cobalt and of lithium arise simultaneously. The optimum result so far was reached by the use of lithium manganite and lithium cobaltite in the same composition.

The effect of lithium manganite might be due to its stability in the smelter, where it acts in an entirely different manner from manganese dioxide added as such.

These ground coats allow much thinner applications so that less ground coat enamel is used.

V. Summary

So far, it can be stated the lithium manganite in ground coat compositions, with or without lithium cobaltite, influenced:

Fluxability of the frit in the smelter
Viscosity
Weight of application
Firing range
Firing temperature
Tendency to reboil, fishscale and copperhead
Adherence of the enamel to the steel base
Thermal shock resistance
Use of nickel dip
Choice of steel types and gauges

Examples have been given for the manifold application of lithium compounds in enamels. The survey of literature shows the possible variations. Since neither the use of lithium ores nor of lithium carbonate has been a practical success so far, the new type of lithium compounds now available show interesting possibilities.

Table of Comparison

	Approx. Firing Temp.	Calc. Coeff. of Exp.	% Content of						Thermal Shock Resistance
			Li_2O	SiO_2	B_2O_3	Al_2O_3	K_2O Na_2O	CaF_2	
Group I *		x10^{-7}							
A. Hard Ground Coat (Non-lithium bearing)	1625°	276	—	52.34	14.6	5.4	17.0	5.3	Fair
B. Medium Soft Ground Coat (Non-lithium bearing)	1575°	282	—	47.8	16.75	4.9	18.42	5.87	Good
C. Same frit as B, but MnO_2 replaced with Li_2MnO_3	1540°	282	.57	47.8	16.75	4.9	18.42	5.87	Excellent
D. Same frit as C, but increased Li_2MnO_3	1520°	280	.98	47.25	16.55	4.75	18.1	5.8	Excellent
Group II ** All lithium-bearing									
E. Ground Coat No. 14	1540°	281.0	.31	52.35	15.35	4.48	19.75	6.7	Excellent
F. Ground Coat No. ST-1	1540°	272.1	.39	48.6	19.2	4.05	18.88	6.7	Excellent
G. Ground Coat No. ST-4	1540°	271.4	.45	48.7	19.2	4.07	18.89	6.7	Excellent

"Excellent" means 15 cycles-plus according to E.U.M.C. test.
The impact shock test did not show any variations.
The bond test was excellent on all samples containing lithium; good to very good on A and B.

* Group I comprises formulae in practical shop use.
** Group II comprises formulae quoted earlier in this article.

Acknowledgment

The writer wishes to thank Walter M. Fenton, B. R. Babbitt, and the Metalloy Corporation, for formula suggestions and information and material furnished for the experimental work; and B. T. Sweely and the Chicago Vitreous Enamel Product Company for testing frits and furnishing thermal expansion data charts.

(8) Jour. Amer. Ceram. Soc., 29, 10 (1945).
(9) A Manual of Porcelain Enameling, page 243 (1937).

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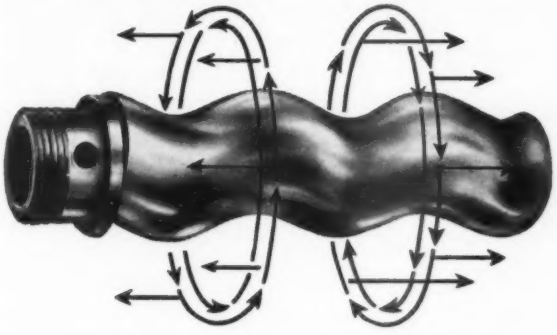

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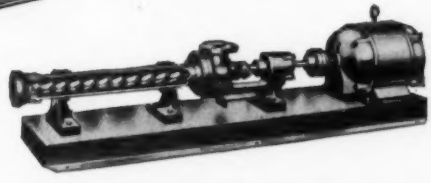

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Man for sales or service-sales work in porcelain enamel industry, experienced, preferably Illinois and Indiana.

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More news

→ *from Page 43*

while working for the Mosaic Tile Co. and the Cambridge Tile Co. and for 12 years did sales, development and service work for the Vitro Manufacturing Company, Pittsburgh, Pa.

Fellows inducted at A.C.S. Atlantic City convention

Fellows inducted at the 49th annual meeting of the American Ceramic Society were the following:

Ralph Brenner, Anchor Hocking Glass Co., Lancaster, Ohio; Vincent Broomhall, Continental Kilns, Inc., East Liverpool, Ohio; Ralph Cook, professor, Department of Ceramic Engineering, University of Illinois, Urbana, Ill.; Charles Freeman, A. P. Green Firebrick Co., Mexico, Mo.; Charles Harder, professor, Department of Ceramic Engineering, Alfred University, Alfred, New York.

Andrew Johnson, professor, Department of Ceramic Engineering, Iowa State College, Ames, Iowa; Frederick Petersen, professor, Department of Ceramic Engineering, University of Illinois, Urbana, Ill.; Frank Porter, Inland Steel Co., Crown Point, Ind.; Edwin M. Rupp, Columbus, Ohio, and William Stafford, Mayer China Co., New Brighton, Penn.

W. K. Gresham dies suddenly

The recent sudden death of W. K. Gresham, of Cleveland-Tennessee Enamel Co., will come as a shock to his friends in the porcelain enameling industry. He died at the age of 42 of a heart attack after only a few hours illness.

Bill started with the Cleveland company at its inception in 1928, and at the time of his death was assistant general manager.

Articles to read

Materials & Methods, July issue, is to feature an article on porcelain enamel as an engineering material.

National Real Estate & Building Journal published an illustrated article in its May issue covering the advantages of remodeling buildings with porcelain enamel. This is typical of editorial material produced through the cooperation of the Porcelain Enamel Institute.

A.C.S. section meetings

New York Metropolitan Section of the American Ceramic Society held its spring dinner-meeting at the Building Trades & Employers' Association Building, New York City, May 23. The following officers were elected and installed: James D. Tetrick, chairman; Perry C. McCollum, vice chairman, and Josephine Getter, secretary-treasurer.

Northern Ohio Section held its final spring meeting on June 5 at the Cleveland Engineering Society, with 74 in attendance. Among those present were S. A. Jackson, dir. and gen. mgr., and George Ashton, technical advisor, of Samuel Fox & Co., Stockbridge Wks., United Steel Companies, Ltd., Sheffield, England.

Dr. E. L. McCandless of the Linde Air Products Co., Tonawanda, N. Y., gave an illustrated lecture on "Some New Industrial Uses of Oxygen." A sound film, "Story of a Sparkplug," was also presented.

Burning tool bulletin

Chrome-nickel burning tools for handling all types of work in porcelain enameling furnaces are illustrated with drawings and photographs in the bulletin, "Burning Tools for Porcelain Enameling." Tools for both box and continuous furnaces are shown.

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